The Chemical Age

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Notes and Comments

The Electrical Grid

THE last pylon of the electrical grid has just been erected and the great £27,000,000 scheme is now complete. By the end of next year the whole 4,000 miles of transmission line will be working. The grid itself is only the back-bone of a great structure which in course of time is expected to appear. Whether it will do so or not, or whether all this money has been expended in vain, depends entirely on the user. Corporations, councils and trading companies in the country who possess the power to supply electricity are urged to do their part by creating thousands of miles of lines to distribute the grid current. Unless this is done the grid will be useless. Because a works or a house happens to be situated near a grid line, it cannot obtain current unless the local authorities do their part by transforming the voltage and putting in the necessary supply lines. In the end, however, the consumer will be the deciding factor. Industry, commerce and the householder will all buy their light and power from the cheapest source. All that has been achieved by the expenditure of £27,000,000 has been the switchboard of the supply undertaking. The parallel experience of the gas industry is that although reduction in the manufacturing costs must receive due weight, the real expense occurs in distribution. The price at which current can be supplied to the local authorities will thus be considerably lower than the price at which they can distribute it.

Electricity and the Chemical Industry

BEARING these facts in mind it is well to ask of what service the grid will be to the chemical industry. We should like to hear a chemical engineer answer this question. One effect will almost certainly be the closing of all private generating stations, except where these are retained as a standby against possible failure of the grid supply—a contingency that should be very remote. For all minor uses such as motor-driven pumps, laboratory current and small electric melting furnaces, the grid should result in somewhat lower cost. For the major chemical industries which have been established in foreign countries upon the basis of cheap water-power, the grid will be useless since the cost of current will be far higher than that at which it can be obtained in other countries. If the grid is to be of any real value to the chemical industry, it will be necessary to supply current at well under cost, the loss being made up by higher charges to other consumers. We can quite understand that other industries would complain loudly if anything of this sort were to be proposed; but there is something to be said for the suggestion that the private consumer should not be given too low a rate and should thus be made to subsidise industry. It could be proved that this would be to the ultimate advantage of the individual, and would at least be better than subsidising unemployment whilst buying from abroad. That is just one suggestion; probably there are others much better. Meanwhile, the grid is completed and "it remains," we are told, "to harness this new power to the uses of the nation."

Sulphur Recovery

SULPHUR appears to be simultaneously one of the most useful and most troublesome of elements. In the right place and securely muzzled, it is, like fire, a good servant, but in the wrong place it is, also like fire, a bad master. This generation has realised that a little let loose in the atmosphere may cause untold damage to buildings and to health. The difference between the viewpoints of this generation and the last is one of degree. Our fathers only recognised the detrimental qualities of sulphur in its compounds with oxygen when it was present in amounts disagreeable to the senses; they insisted on its removal from town's gas—and the gas companies have ever since been struggling to make into a profit an operation that is a source of considerable loss. Likewise the coke ovens, realising that they burnt in the flues more sulphur than they were buying for the purpose of making sulphate of ammonia, encouraged inventors to work on the problem of utilising this sulphur. As our correspondence columns have shown, the problem is now being tackled by the recovery of the sulphur in elementary form. The point we wish to emphasise is that where it has long been recognised that sulphur is deleterious and must be removed, attempts have been made to convert an unprofitable process into one that is profitable—or that, at the worst, does not result in a loss.

During the last few years the recognition of the deleterious effects of very small quantities of sulphur oxides has caused the sulphur elimination problem to spread to power stations, and the larger generating stations are either taking stock of the situation or are actually meeting it. At Battersea the whole volume of combustion gases is scrubbed with a very large quantity of warm water which amounts to about 20 tons per ton of coal burnt (with the low sulphur content of under 1 per cent.), followed by a final treatment with alkali such as lime or chalk mixed with water, thereby removing from 90 to 95 per cent. of the sulphur. Iron is present to catalyse the reaction of SO_2 with oxygen. Water spray is removed from the gases and preheated air is added to remove any possibility of the formation of rain at the chimney. All the scrubbing water together with

the sludge is discharged into the Thames. Clearly the process is not only unremunerative but recovers none of the sulphur removed from the gases.

A Profitable Operation

THERE is also an American process originated by Professor Johnstone which depends upon the use of 0.025 per cent. of a manganese salt in the washing water as catalyst for the SO_2 to SO_3 reaction. Here the water is not run to waste but is constantly recirculated, and up to 95 per cent. of sulphur can be removed by the use of only $1\frac{1}{4}$ tons of water. An important part of the process is that sulphuric acid is recovered at 35 per cent. strength. A third (British) process also used on a works scale is that devised by Mr. H. E. J. Green in which the gases are washed with milk of lime in a standard form of gas washer, 90 per cent. of the sulphur and most of the dust being removed. The washer is so operated that the milk of lime is completely used up by the time it reaches the effluent end of the washer. Addition of a little fresh lime causes the rapid precipitation of the sludge, which can be continuously discharged from the washer. The washed gas passes to the chimney after heat interchange with the incoming hot flue gases. The clear water can be used over again for making the milk of lime; the sludge can be worked up for recovery of the sulphur present as sulphate and sulphite by calcination, the sulphur radicle being converted into sulphuric acid or sulphate of ammonia.

It will be clear from this brief summary that sulphur recovery from power station gases is moving in the direction of profitable operation, perhaps even more quickly—and let us hope more successfully—than did sulphur recovery from town's gas. We cannot resist pointing out that there must be a great opportunity here for the enterprising chemist. We have been taken to task for suggesting that more sulphur could be obtained from the gases evolved from the distillation of coal; we do not think anyone will gainsay the statement that it is worth while trying to recover the sulphur from the larger power stations and furnace installations all over the country. If only 10 per cent. of the coal we burn at home came under this heading, we should recover some 200,000 tons of sulphur annually. There is no valid reason why, with chemical perseverance, we should not become virtually self-supporting in sulphur.

Alcohol as a Motor Fuel

WE have commented from time to time on the possibility of producing alcohol in quantities vastly greater than it is now made for use as a fuel for internal combustion engines. Alcohol is being manufactured synthetically in Germany and Belgium from coke oven gas whilst France has made it compulsory for oil companies to purchase a certain percentage of alcohol in relation to the quantity of benzol they distribute. There has even been an attempt to introduce the same compulsion in the United States—the home of the petroleum industry—in order to assist the farmers. In England, however, very little is heard of alcohol fuel, although there is probably no country where the use of home-produced fuel would be more welcome. Already the oil interests are threatened by hydrogenated oil, by compressed coal gas, by producer gas generated from charcoal or low temperature coke and, to a less extent, by oil distilled from coal. For the past 18 months there has been in existence a company in this country engaged in the distribution of "alcohol petrol," which is a blended mixture of alcohol and petrol, the inherent difficulty of mixing petrol and alcohol being overcome by using absolute alcohol.

It is of interest at this stage to note the advantages claimed for alcohol petrol as set forth in a recent publication by Mr. A. R. Ogston, chief chemist to the company we have in mind. Since all motor fuels are so similar in general properties, it is held that the deciding value of the worth of the several petrols is the anti-knock figure. Only in this regard is one petrol markedly different from another. There are three accepted methods of improving the anti-knocking properties—addition of benzol, addition of lead tetra-ethyl, and admixture with alcohol. The efficiency of benzol is comparatively low in this respect and there is not sufficient benzol available for the purpose; the permitted proportion of lead tetra-ethyl is too small to raise the octane number sufficiently, but the addition of 20 per cent. of alcohol is claimed to be not only sufficient but more effective than any other steps. Certain properties of the alcohol-petrol mixture, such as the formation of constant-boiling compounds and the lower temperature of the ingoing fuel coupled with the greater anti-knock properties combine to maintain the fuel consumption of the mixture as low as when using straight petrol.

These advantages are powerful, though perhaps not decisive. Time will show, but public taste will be the ultimate arbiter. The chemical industry will be watching the outcome keenly, ready to take advantage of the new situation, in collaboration with agriculture, if alcohol petrol seems to attract the public fancy and to possess the solid advantages that its friends claim for it.

Plant Refinements

CHEMICAL plant occasionally suffers from excessive attention to trifling features and lack of detail. It is one of the indirect effects of the wave of labour-saving enthusiasm which has swept over us during the past ten years. With the labour-saving houses there came a variety of gadgets; but gadgets were not restricted to houses. They claimed attention for motor cars, office equipment and factory plant. Chemical plant was not immune; the patentee became busy, the plant maker adopted and the plant user paid the bill. In some cases the plant user has never regretted that expenditure of a few extra pounds, but sometimes it is doubtful if he has really profited by it. A quick-opening manhole has decided advantages if it needs to be opened at fairly frequent intervals; valves which can be operated from accessible positions, and gauges which can be read easily and distinctly have much more to commend them. Extravagance in the provision of recording instruments is to be deplored; charts become useless when the plant user lacks the knowledge or need for correctly interpreting the recorded data. Recording instruments, generally, can be installed when the plant is actually in production, for it is then that the user finds the desirable points at which to place them. Refinements which make for safety cannot be under-estimated in value, and for works where trade tides may have unexpected effects a reasonable degree of adaptability is important.

Recent Progress in Non-Ferrous Metallurgy

Institute of Metals Silver Jubilee Meeting

A BRIEF review of some of the more important steps in metallurgical progress during the twenty-five years of the existence of the Institute of Metals was outlined by Dr. Walter Rosenhain, on the occasion of the Silver Jubilee Autumn Meeting of the Institute, which was held at Birmingham this week. The matters touched on were those which have been of particular interest to the author and in some degree associated with the Institute.

A civic welcome was given to the members of the Institute, on Tuesday morning, by the Deputy-Mayor (Alderman J. B. Burman), at the Central Technical College. Birmingham, said Alderman Burman, was naturally proud that the Institute, like so many other good things, had its origin in the city. Birmingham had always been regarded as a centre of the non-ferrous industry. The city was therefore a fitting place to inaugurate the Institute. He congratulated the Institute upon the celebration of the silver jubilee. The optimism of the founders had been amply justified, the membership having increased from 250 to more than 2,000.

Development of New Materials

In the course of his paper, Dr. Rosenhain said there could be no doubt that, in regard to the scientific aspect of metallurgy, the Institute had provided a centre for publication and discussion which had stimulated research throughout the whole field of metallurgy and far beyond the immediate scope of the Institute itself. It might fairly be claimed that nowhere else did the scientific aspects of the subject receive an equal amount of attention. In thus emphasising the value of the work of the Institute on the scientific side, however, he did not wish in the slightest degree to underrate the great importance of the practical questions which the manufacturing and engineering members of the Institute brought forward; on the contrary, it was the function of the Institute as the meeting ground of all three types of members that lent it a special character and greatly increased importance.

Alluding to new materials still in the course of development, Dr. Rosenhain pointed out that the investigation of beryllium and similar more or less rare metals was not only justified, but important, because it had been found again and again in the past that a rare metal which was a laboratory curiosity had in a few years become a commercial product. Aluminium and tungsten were perhaps the most striking examples of that kind. With regard to corrosion, he said, while they must recognise the important services which the existing theory of corrosion and of "differential aeration" had rendered in explaining many of the complicated phases of the process, they looked forward with interest to further developments and to the formulation of a more complete theory which would no doubt be built up by a combination of the older and the new knowledge. Whatever theory of corrosion might ultimately find general acceptance, there was at least one discovery which had been gradually established over a period of years which not only explained many of the phenomena of corrosion, but was also a valuable means for providing certain metals and alloys with protection against chemical attack. This was the discovery of the important part played by the surface film which was formed on most metals, if not on all, either by the action of atmospheric oxygen or of moisture or of both.

Porosity in Copper Ingots

Further observation on the distribution of porosity in aluminium and copper ingots, with some notes on inverse segregation, were reported by N. P. Allen. Three copper ingots and four aluminium alloy ingots cast in a specially tapered mould were examined. In all cases the distribution of porosity followed the probable form of the isotherms in the cooling mass, and was much influenced by the mould taper. The type of micro-structure also had an influence on the distribution of porosity, the nature of which was discussed. The inverse segregation of two aluminium-copper alloy ingots was found to be closely related to their porosity.

Wear in the polishing of plated and other surfaces was dealt with in a paper by O. F. Hudson. A series of tests was made in the laboratory of the British Non-Ferrous Metals Research Association to determine the comparative rates of wear of plates and other metal specimens under conditions of polishing as distinct from abrasion. Considered as loss of thickness, the rate of wear of the palladium-plated specimens was found to be greater than that of the platinum-plated specimens, but considered as loss of weight, the wear of the palladium coatings was slightly less than that of the platinum coatings, whilst the precious metal coatings generally were more resistant than the same metals in massive form. Of the three types of palladium-plating, that in the "soft" condition showed the greatest wear, but the differences were not great; there was little difference in the rates of wear of the two kinds of nickel-plating. No definite or consistent relationship between hardness and rate of wear in polishing was revealed in these tests.

Heat Treatment of "Standard Silver"

The heat-treatment of "standard silver" received the attention of H. O'Neill, G. S. Farnham and J. F. B. Jackson, who investigated the precipitation-hardening of quenched "standard silver" (7.25 per cent. copper) by Meyer hardness analysis. Precision X-ray spectrograms obtained with Cu-radiation from thick disc specimens of the heat-treated alloy indicated that surface preparation may considerably affect the lattice parameter results. Polishing should be avoided in this work, and etching may have bad effects. Quenched "standard silver" when reheated for 30 minutes in the 300° C. region is in a sensitive condition, and appears to precipitate completely when deformed. If precautions are taken, the lattice parameters indicate a normal progressive precipitation of copper constituent as the quenched alloy is reheated at increasing temperatures.

The properties of nickel-copper-aluminium alloys with nickel contents from 10 to 45 per cent. and aluminium contents up to 4 per cent. were reported by D. G. Jones, L. B. Pfeil and W. T. Griffiths. The relationship between composition and capacity for hardening by heat-treatment was studied by means of hardness tests on the heat-treated specimens. A study was also made of the most suitable heat-treatments to produce the soft condition, and the stability at elevated temperatures of a selection of the alloys in the precipitation-hardened condition. Finally, the mechanical properties were determined of a group of alloys selected and prepared in accordance with the results of the preliminary experiments. In certain cases the properties of the 20 per cent. nickel alloys were studied in greater detail than those at other nickel levels, but sufficient work was carried out on alloys containing 10, 30 and 45 per cent. nickel to enable the properties of alloys at these levels and over a range of aluminium contents, and in various conditions of heat-treatment to be deduced.

Patina on Copper

Further notes on the green patina on copper were given by W. H. J. Vernon, who has now studied the patina from a copper structure in mid-Wales containing 20.75 per cent. basic copper chloride, as compared with 8.15 per cent. in the patina from a copper spire at Dundalk, on the east coast of Ireland (approximate ratio 2.5 : 1), this result being attributed to the influence of prevailing winds. Basic copper sulphate constituted the bulk of the deposit in each case, relationship of formula with period of exposure confirming the conclusions of previous work.

A graphical method for converting the weight percentage compositions of ternary systems into atomic or molecular percentages was described by W. Hume-Rothery. The method permits the direct transference of a triangular diagram drawn on the weight percentage scale to one in atomic percentages, and the accuracy obtained is of the order 0.1 to 0.5 per cent., according to the precision of the instruments and of the ruled triangular paper.

The preparation of lead and lead alloys for microscopic examination was the subject of a contribution by Brinley

Jones, who outlined a method for the rapid preparation of lead and tellurium-lead for low and high-power examination. By this method the time devoted to preliminary polishing is restricted, the true structure of the metal being revealed by chemical solution of surface layers. After the removal of recrystallised layers, sections may finally be prepared for high-power examination by a treatment of alternate polishing and etching, the final polishing being vigorous.

Properties of some temper-hardening copper alloys containing addition of nickel and aluminium formed the subject of a paper by H. Brownsdon Cook and H. J. Miller. In this study of the effect of quenching and tempering on the properties of a number of copper alloys containing nickel and aluminium, was found that when nickel, together with aluminium, is present in certain quantities and ratios, the hardness and other mechanical properties of the alloys are very considerably modified by the thermal treatment to which they are submitted. The alloys are softened by quenching from relatively high temperatures, and the quenched alloys, both in the soft and cold-worked conditions, harden considerably when reheated or tempered to an intermediate temperature somewhat below the annealing temperature.

Corrosion Fatigue Characteristics

Dealing with the corrosion fatigue characteristics of an aluminium specimen consisting of two crystals, H. J. Gough and D. G. Sopwith stated that the main object of this experiment was to investigate the effect of an intercrystalline boundary on failure by corrosion fatigue. The experiment was carried out under alternating torsional stresses in a slow stream of tap water. The boundary was not attacked by the corrosive medium, nor did it influence in any visible manner the method of failure of the specimen, which took place primarily by the formation of cracks in areas undergoing heavy plastic deformation. On the surface of the specimen these cracks were generally parallel to the traces of the operative slip-planes; in several cases they had their origin at holes situated in the most highly stressed regions. Of the origin of these holes, however, no definite evidence is available. Whilst general attack in the form of oxide film and small pitting occurred throughout the duration of the experiment (about 6 weeks), this did not contribute to any appreciable extent to the failure of the specimen.

In the experiments in wire-drawing were reported by W. E. Alkins and W. Cartwright. Silver-free h.c. copper of good quality (99.95 per cent. copper) was drawn into nominal No. 12 S.W.G. (0.104 in.) wire, intermediate annealing being introduced in such a way as to furnish eleven coils of wire varying in breaking load from 399 to 544 lb., and with reductions of area after annealing of from 36 to 97 per cent. Samples were annealed for periods varying from 1 to 24 hours and at temperatures from 130° to 280° C. It was found that the annealing behaviour depends not so much on the original tensile strength of the wire as on the amount of reduction by cold-work which it has undergone. The more lightly drawn wires show an appreciable increase in strength after annealing at low temperatures. They retain their strength at temperatures up to, say, 250° C., very much better than the harder wires; the latter begin to soften at temperatures little above 100° C., and the rate at which strength is lost increases with increasing cold-work. The hardest wires all show a definite decrease in breaking load after storage for 2 years at room temperature; the more lightly drawn wires show no change. This apparent differentiation is again suggested by the breaking load/temperature curves from 450° to 850° C.: the lightly drawn wires decrease slightly but steadily in strength with rising temperature, but all the harder wires without exception have higher breaking loads after annealing at 750° C. and again at 850° C. than they have after heating at 650° C.

The constitution of the silver-rich aluminium-silver alloys dealt with by N. Ageew and D. Shoyket, who determined the constitutional diagram by micrographic examination, X-ray analysis, and hardness measurements. They report that β'-phase (Ag_3Al) is converted on heating above 400° C. into a mixture of α and γ. The α- and γ-phase boundaries at high temperature have been determined by precision measurements of the lattice parameter and by micrographic examination of the quenched alloys. The β-phase is stable only at high temperatures, and below 600° C. is converted into the $\alpha + \gamma$ eutectoid.

The Autumn Lecture

This year's autumn lecture was delivered by Mr. W. R. Barclay, vice-president of the Institute, who took for his subject "Twenty-five Years' Progress in Metallurgical Plant." Mr. Barclay dealt with this progress under four headings: (a) developments in melting and casting equipment, (b) rolling-mill machinery, (c) rod-and wire-drawing plant, and (d) auxiliary equipment, such as annealing furnaces. The outstanding features of these developments have been the introduction and widespread adoption of electric melting; the use of water-cooled moulds, and the Durville system in casting; and improvements in rolling methods and machinery. Improvements in annealing equipment were described and modern furnaces were compared with the older types in common use in the earlier years of the period. Reference was also made to extrusion processes and their application to products other than rods and profiles.

The Iron and Steel Institute

North Lincolnshire Works Visited

MEMBERS of the Iron and Steel Institute, who attended the annual conference at Sheffield last week, visited the Scunthorpe iron and steel area of North Lincolnshire on September 15. Over 400 delegates made the journey by special train. Among them were the acting-president, Sir Harold Carpenter, Sir Robert Hadfield, Sir John Beale (chairman of Guest, Keen and Nettlefolds, Ltd.), Sir R. Murray Hyslop, Sir Berkeley Sheffield, Capt. R. S. Hilton (managing director of the United Steel Companies, Ltd.), the Lord Mayor of Sheffield, Colonel Sir Charles Wright, Mr. J. E. James (managing director of the Lancashire Steel Corporation), and a number of professors from the universities of Sheffield, Manchester, London and Glasgow. The guests were welcomed by Mr. J. Henderson (managing director of the Frodingham Iron and Steel Co., Ltd.), Mr. A. Crooke, Mr. W. James Brooke, and Mr. F. G. B. Gough (president of the Lincolnshire Iron and Steel Institute), and Mr. E. Kennedy (chairman of the Scunthorpe Urban Council).

The works visited were the Frodingham and Appleby Works of the United Steel Companies, Ltd., the Normanby Park Works of John Lysaght, Ltd., the Redbourn Steelworks of R. Thomas, Ltd., and the steel foundry of Firth and Brown, Ltd., Sheffield. These works are among the most modern plants in Europe, and are now all working fully for the first time for many years.

The Institute of Fuel

October Meetings in London

THE opening meeting of the autumn session of the Institute of Fuel will be held in the lecture theatre of the Geological Society of London, Burlington House, Piccadilly, on October 11, at 5.30 p.m., when Sir John Cadman, the Melchett Medallist for the current year, will deliver the Melchett lecture, his subject being "The Place of Oil in the World of Fuel." Sir Hugo Hirst, president of the Institute, will take the chair at this lecture. The Melchett medal will be presented to Sir John at the annual dinner of the Institute which is to be held on October 18.

On October 18, Sir Hugo Hirst, who has served the Institute as president for the past two years, will relinquish his office and install the president-elect, Sir William J. Larke, in his stead. This ceremony will take place at 11.30 a.m., in the lecture theatre of the Geological Society of London, and will be followed immediately by Sir William's presidential address. In the afternoon, at 2.30 p.m., Dr. E. W. Smith will open a discussion on "Recent Developments in Coking Practice." The most recent developments of both high and low temperature coking practice will be dealt with in this discussion.

To each of these meetings the Council of the Institute of Fuel extends a cordial invitation to all members of other societies who wish to be present. No tickets for admission will be required.

German Chemical Industry in 1932-1933

Political Changes the Dominating Factor To-day

A REPORT on "Economic Conditions in Germany," covering the period from September, 1932, to June, 1933, has been published by the Department of Overseas Trade (H.M. Stationery Office, price 4s. 10d. post free). A large section of this report is devoted to a summary of political events, which are of paramount importance in estimating the position in which industry now finds itself. Laws which have come into being since Herr Hitler took power—compulsory labour service, schemes for the reduction of unemployment and anti-Semitic movements—have profoundly affected every industry, trade and profession in the country.

It states that Germany's general economic development during 1932 was unsatisfactory, though in the second half of the year there were certain slight signs that perhaps the downward trend had ceased and that a measure of stability at a very low level had been reached. On the other hand, all public budgets, including that of the Reich, were suffering from heavy deficits, the foreign trade surplus was dwindling and there was no appreciable diminution in the volume of unemployment. Germany entered upon the year 1933 in a state of depression with many difficulties to face, but there existed a feeling that the bottom had been reached. This comparatively optimistic calm was shattered by the dismissal from the chancellorship of General von Schleicher at the end of January, and it was not until the National Socialists had, by successive coups culminating on March 22 in the passing of an Enabling Act, firmly established themselves as rulers of Germany, that hopes for greater trade activity were entertained. It was pointed out in the last report that the whole of German economy was subordinated to the one aim of protecting the Mark exchange. The same course was pursued during the period covered by the report, but international trading conditions have so far deteriorated that modification of this policy has been found essential.

Position of the Chemical Industry

The position of the chemical industry is revealed by a statement of the activities of the German Dye Trust (I. G. Farbenindustrie). The turnover in various departments fell off both in volume and value below the level of 1931. An upward tendency was, however, observed in the fourth quarter of 1932, so that output in certain branches at the beginning of 1933 had reached or surpassed the preceding year's figures. The depressed position of the world market caused by currency depreciaton, quotas and foreign exchange restrictions was more pronounced than during 1931. The Trust endeavoured to overcome these difficulties by concluding private clearing agreements with some countries.

Trade in chemicals was described as satisfactory, due to the wide basis in the home and foreign markets. Business results in pharmaceuticals were also satisfactory; a revival in sales took place towards the end of the year, but prospects in certain important markets were scarcely favourable in view of regulations recently introduced. The quantity of rayon disposed of in 1932 was more than in the previous year; prices were lower, but progress in manufacturing methods compensated to a certain extent for this loss. Costs of petrol production at Leuna were lowered. The company's mines produced 15 million tons (metric) of lignite, 84,000 tons of coal and 32,000 tons of coke. The number of employees was 66,500 at the end of 1932, or 1,500 less than a year ago, and including coal mines and other works controlled 97,400 among whom were 4,000 hands taken into employment during the last quarter of 1932. Working hours at that date were generally 40 to 42 per week.

Nitrogen Fertilisers

Sales of nitrogen fertilisers in Germany from January to April, 1933, were 220,000 tons of nitrogen, compared with 235,000 tons during the corresponding months of 1932. Exports for the same period dropped from 279,000 tons of nitrogen fertilisers in 1932 to 175,000 tons this year. The home market was estimated to have consumed 87 per cent. of German nitrogen sales, while exports diminished to 13 per cent. from 40 per cent. in 1929 and 23 per cent. and 20 per cent. in similar periods of 1931 and 1932 respectively. Production of synthetic nitrogen by mining concerns in the Ruhr district fell from 76,300 tons in 1931 to 62,300 tons last year. The Dye Trust increased its nitrogen sales both in Germany and abroad and stocks were reduced, although output was expanded. Conditions in the nitrogen market were stated to be much better after the conclusion of the new international agreements, which were prolonged in March, 1933.

The total output of potash salts in 1932 was 777,800 tons, compared with 935,900 tons in 1931. The degree of employment was very low. Wintershall, with a quota of 41 per cent. in the Potash Syndicate, were stated to have concentrated production on three mines working three days a week. Burbach, with a quota of 17.5 per cent. were also working three days a week with only seven mines. Out of a total of 229 potash shafts, 124 were closed down completely in February, 1933, and 105 were in commission or reserve. The German potash industry is faced with four outstanding problems, *viz.*, price cutting by foreign competition, the granting of credit to German farmers, the payment of interest on foreign capital and further expenditure in closing down other mines.

The Potash Syndicate

Sales of the German Potash Syndicate dropped from 1.36 million tons of potash salts in 1930 to 964,000 tons in 1931 and 850,000 tons last year. Sales within Germany from January to April, 1933, were 400,000 tons, as against 351,000 tons in the corresponding period of 1932. Exports of potash fertilisers to Great Britain in the past two years were: 1931, 56,381 tons; 1932, 43,833 tons. Total exports to all countries amounted to 540,878 tons in 1931, and 461,005 tons in 1932. Exports of potash fertilisers from January to April, 1933, amounted to 127,000 tons, compared with 174,000 tons for the same period last year.

The North German Salt Syndicate was renewed in December, 1932, until the end of 1937, and the name changed to the "Norddeutsche Salinenvereinigung G.m.b.H." About 60 per cent. of German salines are owned by the potash industry, who also control the Rock Salt Syndicate. The total basic quota of saline salt has now been fixed at about 235,000 tons to 240,000 per annum. Of the 22 works concerned, eight with a quota of 15 per cent. have been closed down and received compensation at the rate of RM.10 per ton of output quota. There are still three outside firms with a total capacity of 35,000 tons. The lower degree of activity was reflected in the balance sheets of potash concerns. Saltzdetfurth reduced its dividend from 9 per cent. in 1931 to 7½ per cent. in 1932. Its associated companies Aschersleben and Westeregeln paid 5 per cent. for the past year instead of 6 per cent. a year ago. The decrease was attributed to losses in foreign trade, which formerly provided the firms' profits, while home prices scarcely covered costs of production.

The Cement Industry

Sales of the German cement industry in 1932 amounted to 2.8 million tons, as against 3.7 million tons in 1931 and 7.6 million tons in 1928. The turnover rose from 145,000 tons in February to 318,000 tons in March, 1933, compared with 97,000 and 184,000 tons respectively a year ago.

Imports sank from 123,000 tons in 1930 to 75,000 tons in 1931 and to 54,000 tons last year. Exports declined for the corresponding years from 952,000 tons to 576,000 tons and 311,000 tons. Over 60 per cent. of German exports were consigned to Holland in 1932, 16 per cent. to other European countries and 13 per cent. to South America. In March, 1933, the four cement cartels in Germany came to an agreement for the next three years, which enabled them to cancel their special competitive quotations. An arrangement was also reached with various outsider firms with a view to curtailing output. The Dutch and German cement industry also arrived at an agreement in March, 1933. The Dutch undertook not to deliver further quantities of cement to Germany and quotas and minimum prices were fixed for the Dutch market.

The consumption of rayon in Germany showed a constant and rapid increase from 9½ million kg. in 1924 to 30 million kg. in 1931. For the first time there was a decline to about 24 million kg. in 1932. The set-back in the turnover of rayon was due partly to the policy of the German Syndicate, which took advantage of a market improvement in the autumn to raise prices, while quotations for other textiles were generally lower. Another important factor was the difficulty met with in export markets, particularly the United Kingdom, which formerly took almost half of German exports of rayon goods. The loss was also attributed to the fact that inland prices were maintained above the level of world market quotations and the premium of about 10 per cent. granted to the working up industry on yarns subsequently exported as finished goods was said to be insufficient. It is interesting to note, however, that rayon yarn exports rose for the first time. The German Viscose Rayon Syndicate came to an arrangement in December, 1932, with French and Belgian manufacturers interested in the German market and allotted them quotas of approximately 6 per cent. and 4 per cent. respectively.

The Paper Industry

Production and sales in the paper industry improved during the last quarter of 1931 to a greater extent than usual. The index of production rose from 76 in September to 87 in December (1928 = 100) and the number of hours worked was higher than in the corresponding period of 1931. In accordance with the decision of the international conference held in the autumn of 1932, the German cellulose output was generally restricted by 25 per cent. from that date. From October 15, 1932, cellulose prices were raised by about 10 per cent., which led to a similar increase in quotation for various kinds of paper. The cellulose industry reported a revival in trade in March, when, with the collaboration of the Ministry for Economic Affairs, a cartel of soda-pulp manufacturers and workers-up was formed. At the same time twenty paper-sack makers undertook to buy certain quantities of raw material from German sources and the output of sacks was made subject to quotas for the respective firms. Prices were raised between 15 per cent. and 20 per cent. The cartel agreement aimed at a considerable reduction in imports of cellulose, especially from Sweden.

With regard to coal by-products, it is stated that in order to put an end to the keen competition on the German coke market, which was even more depressed last year than the market for coal, a convention was formed by the important German coal syndicates and the Dutch mining industry as from October 1, 1932. Under its provisions quotas for coke sales in the various spheres of interest of the syndicates were allotted to the members of the convention. The convention runs until September 30, 1933. The Ruhr coal mining industry cancelled a special rebate of RM.5 per ton for coke, otherwise the prices of coke were not influenced by the convention. The result aimed at by the convention, however, was only partly achieved. The mines of the Eschweiler Bergwerks Verein in the Aix-la-Chapelle district continued to cut prices, particularly in Southern Germany. They could afford to do this, as their parent company, the Arbed, a Luxemburg concern, covered its requirements of Ruhr coke at the cheaper world market quotations.

The business in other by-products also was not unsatisfactory and went a long way towards improving the situation of the coal mining industry as a whole. The formation of a German petrol convention and of the International Nitrogen Syndicate led to a stabilisation of prices for benzole and nitrogen products.

Conditions in the lignite industry remained comparatively favourable. After an increase of output and sales during the period from September to November, 1932, the total German production of lignite in 1932 was 8 per cent. below that of 1931. The consumption of lignite dropped by 9 per cent. in 1932. An agreement was made by the Rhenish Lignite Syndicate and the Central German Lignite Syndicate regarding the distribution of inland and foreign markets for lignite briquettes; it came into force on May 1, 1933, and will remain valid for four years. As the existing agreement between the Central German and the East Elbian Lignite syndicates was extended for a period of 3 years, competition on the entire German lignite market has been regulated for some time to come.

Oil and Motor Spirit

The total output of oil boring companies in Germany amounted to 230,000 tons in 1932, which was an increase of 1,000 tons on the previous year's figures. Production in Thuringia fell from 51,000 tons to 16,000 tons, while there was an advance from 177,000 to 214,000 tons in the Hanover district. Production of motor spirit in Germany was estimated to have risen from 478,000 tons in 1931 to 498,000 tons last year, mainly due to an addition of 55,000 tons in sales effected by the Alcohol Monopoly Department. The output of benzole decreased from 280,000 to 230,000 tons and of Leuna petrol from about 125,000 to 100,000 tons. Imports of petrol were only 1,088,000 tons last year, as against 1,347,000 tons in 1931, and the total value fell by 50 per cent. While Soviet Union and Persian oil imports were practically maintained at 280,000 and 136,000 tons respectively, supplies from America dropped from 659,000 tons in 1931 to 518,000 tons in 1932 and Roumanian deliveries from 148,000 to 78,000 tons. Crude oil imports rose from 241,000 to 270,000 tons. The German oil refining industry was stated to comprise 36 firms with a capacity of two million tons per year at the beginning of 1933.

Letters to the Editor

The Editor welcomes expressions of opinion and fact from responsible persons for publication in these columns. Signed letters are, of course, preferred, but where a desire for anonymity is indicated this will invariably be respected. From time to time letters containing useful ideas and suggestions have been received, signed with a nom-de-plume and giving no information as to their origin. Correspondence cannot be published in THE CHEMICAL AGE unless its authorship is revealed to the Editor.

Sulphur from Gas Purification

SIR,—We have read with interest the remarks of Dr. Foxwell in THE CHEMICAL AGE of September 16, with regard to our observations concerning the purification of gas by gasworks and coke ovens and the production of elementary sulphur therefrom. It is correct that we are interested in the purification of coal gas by means of oxide of iron, but our interest does not end with the sale of purifying material. We have made a complete study of this process in all its aspects and have endeavoured to further the knowledge existing on the subject by disseminating the result of investigations carried out by ourselves or elsewhere. As the result of this work we have come to the conclusion that the removal of hydrogen sulphide by means of oxide of iron is not only the most efficient, but also the most economic process. Its economy depends on local conditions and is obviously greatly increased (25 to 50 per cent.) when there is no need for complying with the standards of purity fixed by the Gas Referees. From the information which is available, it seems not only improbable that a net revenue can be produced from any existing method of gas purification, but that the financial results of oxide purification can be attained by any other process. If this were not the case, promoters and inventors of the various new purifying processes would not be bashful in stating their claims.

With regard to the purification of gas used in the steel industry, we are in entire agreement with Dr. Foxwell and believe that an enormous advantage would be derived from completely purified gas. Apparently the Departmental Committee on Area Gas Supply was of the same opinion but no consensus of opinion exists on this point in the steel industry, which is only clamouring for cheap fuel. The owners of the South Yorkshire grid scheme have probably yielded to the pressure of the majority. While an alteration in this respect may take place, it is impossible to expect that coke ovens will purify any other gas except that which is sold, until gas purification becomes a revenue produring process.—Yours faithfully,

THOS DUXBURY AND CO.

Palace Chambers.
Westminster, S.W.1.

The Chemistry of the Tanning Process

A Discussion at the British Association Meeting

OPENING the discussion on " The Chemistry of the Tanning Process," at the Leicester meeting of the British Association, on September 12, Dr. D. Jordan Lloyd dealt with the chemistry of skin and the problem confronting the tanner. It was pointed out that animal skin consists of a tissue of fibres which are the biological units. Each fibre has crystalline properties and is formed of packets of elongated molecules between which are planes of weakness. The fibre can be split up at these planes into fibrils. This is an essential pre-tanning process since it increase the capillary space through which the colloidal tannins can diffuse and makes the polar groups of the protein accessible to the tan. Collagen carries positively and negatively charged polar groups, and collagen fibres contain both bound and free water. Tanning consists in conferring chemical and physical stability on the collagen fibre by the suppression of the active groups and the elimination of water.

The Catechol Tannins

Dr. Max Bergmann (director of the German Leather Research Association) discussed the chemistry of skins and the catechol tannins and said that whilst the chemical groups of the skins are so altered by tanning that they better resist the chemical attack of the proteolytic enzymes of the organisms of putrefaction, this resistance is limited in vegetable tanned leather. According to the tanning material used, the pre-tanning treatment of the skin and the manner of tanning, the leather can be digested by the proteolytic enzymes to a greater or less extent. The measure of this digestion is a measure of the quality of the tanning. This, it was added, introduced the important question, theoretical and practical, of the exact experimental examination of vegetable tanned leather.

Formerly it was sufficient that the vegetable leather should be analysed for nitrogen content, the protein content, *i.e.*, the hide substance, being calculated. This rough method of controlling quantitatively the tanning effect, however, did not suffice for modern requirements. It had long been accepted that the quality of the leather is dependent on the structure of the constituent fibre, and Dr. Jordan-Lloyd and Marriott in this country had shown that the fibre picture in leather varies with the composition of the salt mixtures used for salting the raw hide. Slides were shown indicating the different nature of fibres of different specimens of leather and the manner in which the enzymes in tanning destroy the raw hide through all processes of decomposition.

Further Experiments

It was pointed out by Dr. Bergmann that he is now undertaking experiments with enzymes with the object of obtaining a more definite conception of how the chemical building units —the different amino acids—fit together in the structure of the skin, and he expressed the hope that it would be possible shortly to publish many important results. It was being made abundantly clear that even in such a field as tanning, pure chemistry can play a very important part and help in the development of technical devices. Again, it was becoming more and more possible for the modern chemist to judge by actual measurement the effect of various working methods on the quality of the finished product. There appeared to have been found a new analytical means for the investigation of leather, since the progress of tanning could be measured by a falling away of a particular chemical characteristic. By simple experiment it could be shown that liming and bating with enzymes have a quite recognisable influence on the colloidal condition of the skin which must make itself felt during the course of tanning. The behaviour of a tanning during the tanning process depended directly on its general chemical character. By sulphiting, the chemical nature was altered and it then produced a leather of different properties from non-sulphited tans. Even the molecular size of the tannin was of fundamental importance in the tanning process.

Tannins and their behavious towards proteins was the subject of a contribution by Dr. K. Freudenberg. It is known that phenols form molecular compounds with amines and amides (*e.g.*, phenol itself with anilin or urea). The amines and amides can be simple or complex, as for example the tannins of the gallo-tannin or catechin groups. It is therefore affirmed that, when a tannin and a protein particle come together, a molecular compound is formed first. In a single tannin particle are available many phenolic groups capable of combining with the active groups of a protein particle. After the first contact the particles combine in such a way that the greatest possible number of the phenolic and peptide groups are near one another. The first process is a contact at single points; the second is the mutual permeation of the parts. Until then the process is mainly reversible. The third process is the condensation of the neighbouring tannin particles to insoluble high molecular compounds. The two first steps may be compared with the adsorption of indigo-white on the fibre; the third resembles in some way the production of the insoluble indigo itself on the fibre, and this process is irreversible. The third step, that is the self-condensation of the tannin, is portrayed in this connection.

The Vegetable Tanning Process

Discussing the nature of the vegetable tanning process, Dr. H. Phillips said that gelatin in solution combines instantaneously with tannins, hides powder less rapidly, whilst the structurally intact hide tans slowly. The speed of tannage is thus governed by the rate of diffusion of the tannins into the hide. This rate of diffusion is dependent on the following inter-related factors: (*a*) the size of the intermolecular spaces in the hide; (*b*) the intensity of the electrical charge on the protein molecules; (*c*) the size of the tannin molecules; (*d*) the charge on the tannin molecules; (*e*) the degree to which the tannin molecules are hydrated. The non-tannins in vegetable tanning materials play an important part in the process since they influence the size of the intermolecular spaces in the hide and also modify the properties of the tannins. Vegetable tanning materials vary in character, and the tanner blends and manipulates the tan liquors so that penetration of the hide by small non-tan molecules is followed by the absorption of tannins possessing large molecules. The reason given for upholding the view that the combination of collagen with tannins is mainly electrostatic in character, were partly salt formation between tannin and protein and partly association arising from the polar character of the molecules.

Dr. P. Maitland described some work with which he has been concerned, in the laboratory of Dr. Freudenberg, at Heidelberg, concerning the synthetic production of Quebracho-catechin. This hypothetical stem substance of Quebracho tannin, called Quebracho-catechin, whose formula was suggested by Dr. Freudenberg in 1925, has been prepared synthetically from the corresponding pyrylium salt. It is very similar to ordinary catechin, and has been condensed to a product which shows many similarities to the purified Quebracho tannin of natural origin. The suggestion was made by Dr. Freudenberg to synthesise the catechin and to compare its condensation products with those of natural origin. He and Dr. Maitland now claim to have established a connection between the synthetically-prepared tannin and the tannins or natural origin, on three grounds—(1) that they have analyses of the same order; (2) the same condensation process; and (3) the same degradation products. In addition to this work, the " phlobaphene " reaction of the catechins was also studied.

The Gelatin Tannin Reaction

Dealing with the gelatin-tannin reaction, Mr. F. C. Thompson, president of the International Association of Leather Trades' Chemists pointed out that this interesting reaction has a long history beginning with Seguin and Humphrey Davy, but has not yet been completely elucidated in spite of the efforts of many workers. The variability in the composition of the precipitate under differing experimental conditions attracted the attention of the earliest investigators and led ultimately to the somewhat vague characterisation of the reaction as a "colloidal" or "adsorption" reaction. At-

tempts to gain a closer insight into the mechanism have been made in several quarters. J. T. Wood showed that the reaction had little in common with what is usually considered to be adsorption. Stiasny has emphasised the importance of the degree of dispersion of the reactants, whilst Kruyt has considered the reaction as an electrical discharge followed by dehydration. A simple chemical theory assuming the formation of an insoluble salt from the tannin as acid and the gelatin as base (a salt which largely resists hydrolysis by reason of its high degree of insolubility) is fairly satisfactory up to a point but does not cover all the facts of the case. An adequate chemical theory will probably have to take account, following Freudenberg, of the molecular compounds formed by phenols and organic bases.

Engineering Research Cuts Production Costs

By H. R. M. THORP

THE most progressive firms now employ a special production research staff whose duty it is to see that manufacturing methods are being constantly improved. In most factories this department not only pays for itself but is directly responsible for increased efficiency. In other cases, it is accused of hindering production and adding to production costs. These conflicting opinions, however, are not due to some industries being more suited to research than others; actually there is no industry whose methods may not be improved. The unfavourable verdict can only be the result of the research staff being wrongly placed in the factory organisation, or because its method of working is faulty.

The position of the engineering research staff in any factory must be definite. There must be no compromise between the production function and the research function; each has its own separate and distinct part to play, although there must be close co-operation between the two. The work of the engineering research staff is essentially advisory. It must not concern itself too much with immediate output or it will tend to neglect its true work of introducing improvements. Although always acting in an advisory capacity, it must have sufficient strength to ensure suggested reforms being given a fair trial, irrespective of the opinion of individual production heads, who have not always the mentality to appreciate the value of new suggestions.

The head of such a research staff must be a director, or at least a manager, whose status in the firm has the power to force improvements when necessary. Moreover, he must be a man of scientific training and wide outlook. This is not to suggest that research as a function should be superior to the function of production. There must be no over-riding of the one by the other. Differences of opinion should be discussed at regular joint conferences between the two functions. Generally speaking, departmental heads will willingly co-operate once the status of the research staff is acknowledged and will, themselves, often suggest improvements. Their practical experience and knowledge is invaluable and once a spirit of friendly co-operation is established between the two functions, the success of an able research staff is assured.

The Workers' Suggestion Scheme

Suggested improvements are not, of course, the monopoly of the engineering research staff and many firms encourage the co-operation of operators by a "workers' suggestion scheme" of some sort, generally offering rewards in the way of either money prizes or, in rare instances, promotion. Full reasons must always be given when workers' suggestions are rejected, as otherwise the scheme will be suspect and discontent will result. Occasionally it may even be wise to try out unpractical suggestions in order to satisfy the workers that they are unpractical and encourage confidence in the fairness of the management.

A systematic programme is necessary in order to cover the ground adequately and ensure working on the right lines. A succession of unorganised and unrelated bright ideas regarding odd processes about the workrooms is not to be aimed at. There must be one unified policy of improved organisation for the factory as a whole, and all individual reforms must fit into that scheme. The type of man chosen for the work should have had technical education, both practical and theoretical. He must have sufficient breadth of outlook to visualise large scale reforms and must avoid spending too much time on petty improvements not worth the time spent on them. He should take a keen interest in his work for its own sake, and in addition to his daily experience in the factory he must have access to all up-to-date literature, including periodicals, and must be able to visit other factories for purposes of comparison, as well as institutes and showrooms exhibiting machinery, etc., likely to be of use.

Individual Progress

It should be unnecessary to keep close watch on individual progress. If too close records are kept of money saved a tendency may be encouraged to rush through small improvements rather than take time to develop major changes which in the long run result in greater savings. Quarterly or half-yearly reports should suffice. The minutes of regular joint meetings are sufficient indication of immediate progress of work. While extravagance is to be deprecated, it must be remembered that a short sighted parsimony may preclude any real results at all. An accurate estimating and costing system must be run in conjunction with research, so that before being applied, any new scheme may be costed to determine whether the suggested expenditure is warranted. A return on capital of at least 20 per cent. is generally necessary to make schemes worth introducing.

Once the staff is correctly organised, it must be encouraged to concentrate on those channels in which major savings can be effected. Large savings may be realised by analysing standard machinery and speeding it up to give greater output. This usually necessitates replacement and re-design of some working parts, such as the use of constant acceleration cams, strengthening and connecting rods. An increase in output up to 80 per cent. can often be obtained in this way at little cost. This not only saves the purchase of additional machinery but reduces the labour required, as there is usually a fractional surplus at each machine.

By means of laboratory tests it is often found that output can be increased and quality improved by altering the conditions of a process. For instance, the use of a higher temperature or refrigeration may lead to a considerable reduction of manufacturing period. Research with the object of determining the exact function of each part or ingredient also results in considerable savings in raw materials. The use of better raw materials may save waste in manufacture or reduce process time. On the other hand, cheaper raw materials may sometimes be used with advantage.

Improved Working Conditions

By studying the flow of material through the factory, improved lay-outs may be introduced which will reduce internal transport and increase output. Straight line flow is not always attainable but by means of research it may be approached as nearly as possible. Again, operatives do not always discover for themselves the best method of performing an operation. By gradually educating them as to the quickest and most economical movements, and by the elimination of unnecessary motions, time may be saved. A further increase in output may be obtained by placing materials in the most easily accessible positions. By improving lighting, keeping the temperature and humidity of air agreeable, using the right type of benches, and generally preventing unnecessary discomfort, operators may be induced to work faster without additional strain.

There is often avoidable waste in factories and considerable savings can be effected by investigation and by educating operators as to the value of the material wasted. Material for which a use could be found is sometimes thrown away; this may be counteracted by passing all materials through a junk store where it is inspected and then either put to some use or scrapped. Waste can often be sold for a good price.

New Coke Oven Plant Inaugurated

Surplus Gas for Industry

THE new coke oven and by-product plant at Manvers Main, Wath-on-Dearne, Rotherham, was inaugurated on September 19. This plant, which has been built by Simon-Carves, Ltd., of Cheadle Heath, near Manchester, comprises a battery of 30 "Underjet" coke ovens of the twin-flue type having a rated capacity of 500 tons of coal per day, a by-product plant, coal and coke handling equipment, and a coke screening plant. Of the indirect type, the by-product plant includes gas condensers, electrical detarrar, three ammonia and three benzol scrubbers and a complete crude and rectified benzol plant. This benzol plant comprises a still for the production of a high test crude spirit, which eliminates the need for primary distillation in the production of motor benzol, and a complete benzol rectification plant for the production of motor spirit, having two stills each of over 5,000 gallons capacity. The new ovens are fitted with "Wolff" patent self-sealing doors which supersede the old method of clay luting, and the by-product plant has capacity to deal with gas from over 1,000 tons of washed slack per 24 hours.

A blend of two classes of coal will be mixed in proportions suitable for the production of high class coke. Requirements for 30 ovens will exceed 255,000 tons of washed slack a year and over 383,000 tons will be necessary for 45 ovens. In addition to coking in less than half the time taken by the old ovens the new ones will hold twice as much coal. The coal throughput figures for the old and new plants are 5.6 and 31.5 tons respectively in terms of coal carbonised per man per day.

Hitherto the Manvers Main Collieries, Ltd., have not dealt with size coke for domestic and central heating purposes, but now they enter this sphere with a modern plant and the best equipment for supplying a clean, smokeless and low ash fuel for the open grate or central heating installations. It is estimated that the daily surplus gas from 30 ovens, for purposes other than heating the ovens, will vary from three to four million cubic feet, according to the coal throughout. Even after existing domestic and industrial requirements have been met by the company there will remain a considerable surplus of gas of high calorific value for possible future consumers.

"Lighting up," the first step in the final stage of preparing ovens for coke manufacture, was performed by Mrs. O. J. Philipson, wife of the managing director of the company, and Mrs. H. Murray-Philipson, wife of Mr. H. Murray-Philipson, M.P. for Twickenham, who is a director of the company. A party of directors, officials and guests inspected the new plant.

Sir Ernest Simon, chairman of Simon-Carves, Ltd., speaking at a celebration luncheon in the Danum Hotel, Doncaster, congratulated the company on their courage in setting a good example by placing an order for this important plant at a most discouraging time in British industry and thereby providing a considerable amount of employment. He said he had been impressed with the degree of mechanisation which had now been arrived at in the handling of the products of a coke oven plant.

Production of Oil from Coal

Details of a Scheme for South Wales

DETAILS of a scheme for the production of oil from coal were placed before a meeting of the South Wales Industrial Development Council at Cardiff on September 18. This scheme, which has been prepared by Professor G. Knox, Dr. Roy Illingworth, and Mr. H. H. Merrett, provides for the erection of one hydrogenation plant and ten 1,000-ton low temperature carbonisation plants along the south-eastern outcrop of the coalfield at an estimated total cost of £7,000,000. It is estimated that the hydrogenation plant would produce 100,000 tons of petrol a year from about 365,000 tons of coal and would provide permanent employment for 1,000 miners and 1,500 process workers. The ten 1,000-ton low temperature carbonisation plants would treat 3,650,000 tons of coal per annum, producing about 240,000 tons of heavy oil, 140,000 tons of light oil, 70,000 tons of pitch, 3,220,000,000 cubic feet of surplus gas, and 2,520,000 tons of smokeless fuel. These plants would find permanent employment for 4,000 miners and 1,400 process workers. The total value of the products is estimated at £5,475,000 from 4,015,000 tons of coal costing £3,011,250, leaving a balance of £2,463,750 to cover labour costs, water and electricity supplies, maintenance and repairs, rates, taxes, and insurance, and amortisation and interest on a capital expenditure of £7,000,000. Operating costs for the combined plants are estimated at £1,475,000, leaving a balance of £988,000.

Suitability of Welsh Coal

As an alternative to the above scheme, it was suggested that the hydrogenation process might be limited to the oils produced by low temperature carbonisation, together with what could be obtained from gasworks, coke ovens, etc., which would reduce the initial capital expenditure by about £2,000,000, and produce a more profitable yield, as the tar oils, worth £2 10s. a ton, could be converted into petrol worth £15 a ton. Under this scheme a balance of £1,800,000 was estimated on the conversion of 240,000 tons of tar oil into petrol.

With regard to sites for the plants it was suggested that the hydrogenation plant should be at some easily accessible centre, both in regard to the coal suitable and to the low-temperature carbonisation plants whereby the tar oils could be collected for hydrogenation if necessary. The low temperature carbonisation plants it was urged, should be distributed along the S.S.E. rim of the coalfield at the lower ends of the valleys, so that advantage could be taken of the transport arrangements for collecting the necessary coals for blending, and to facilitate the transport of the oil, when necessary, to the central hydrogenation plant. It was further suggested that the most equitable scheme for distribution of these plants would be to start with several 250-ton low temperature carbonisation units and gradually bring them up to the 1,000-ton basis, but that unless the handling plant was initially designed for the larger output this would prove less economical than to have fewer units of maximum capacity.

While there was general agreement at the meeting that urgent measures were essential if the world coal industry was to be rehabilitated, opinions in regard to scheme put forward were guarded. Some of the speakers were apprehensive that the quantity of smokeless coal that would be placed on the market would result in a further injury to the coal trade, but Colonel A. Vaughan Cowell, chairman of the National Carbonising Co., Ltd., who criticised some of the details of the scheme, was of the opinion that the country could not continue to burn raw coal, and that smokeless fuel would have to come. Eventually it was agreed to refer the scheme to the committee already appointed to investigate the question, with power to add technicians and commercial representatives to their number, and to report to a further meeting of the council.

GERMANY'S vast road construction programme, expected to entail the expenditure of over one billion marks, has led to a keen competitive struggle between producers of asphalt and tar in meeting the huge requirements of the plan in the way of road surfacing. A decision to exclude asphalt on the grounds of being a foreign material was protested by German asphalt concerns, and the entire question of the nature of the materials to be used for road covering is being subjected to further examination by German authorities. Germany's imports of coal tar have increased more than tenfold this year, rising to 13,141 metric tons in the first five months from 1,238 tons in a like period of last year.

Poisoning by Industrial Gases

Compensation Not Recommended for H_2S and CO

THE Home Office Departmental Committee on Compensation for Industrial Diseases has now issued its second report on the subject of poisoning by sulphuretted hydrogen and by carbon monoxide (H.M. Stationery Office, price 6d. net). This committee, however, does not feel justified in recommending that poisoning by either of these gases or any of their sequelæ should be scheduled under Section 43 of the Workmen's Compensation Act.

Mr. A. E. Iles, F.R.C.S., gave evidence that a large number of workmen employed at an artificial silk works had attended at the Bristol Eye Hospital during the period May to August, 1927. The men complained of irritation of the eyes and asked for certificates which they could produce to their employer to prove that they had attended at the hospital and so account for their absence from work. In the great majority of these cases the eyes were not sufficiently affected even to need examination by a doctor, and in six cases only out of about four hundred and fifty was the workman admitted as an in-patient. He did not think that continued exposure to the gas could produce corneal affection. As soon as the first aid arrangements at the works in question were improved, the numbers attending hospital became very small.

Dr. J. A. Lloyd, chief engineer of Courtaulds, Ltd., gave us some interesting figures as to periods of absence. He told the committee that out of about 2,000 employees exposed to H_2S, 165 had been treated for conjunctivitis during the previous 26 months. One hundred and forty of these resumed work after having their eyes bathed and had not reported any further trouble; twenty of the remaining twenty-five were treated twice. He said that the total time lost during the 26 months amounted to 404 hours. In only four cases was the workman away for more than three days, and in the two cases of longest absence it was impossible to establish a connection between the conjunctivitis and the work; in no case did the absence exceed one week.

The A.B.C.M. Gives Evidence

The Association of British Chemical Manufacturers submitted evidence based on inquiries as to ill-health among employees of associated firms. The statistics they had been able to collect did not indicate that among workmen liable to encounter CO there was any excess of illness of a kind which this gas has been said to produce (apart from cases of accidental gassing). Their evidence indicated that the not infrequent cases of acute poisoning by CO, whether severe or slight, are widely recognised and regarded as gassing accidents. Most of these cases involve little or no loss of time; and only a small proportion result in disablement for more than three days. The records of the subsequent health of men who had been affected did not point to sequelæ such as mental impairment or pneumonia. The tenour of the medical evidence submitted by this association was that chronic CO poisoning does not exist; that the symptoms associated with relatively slight gassing cases are dyspnoea, headache, dizziness, palpitation, and a sense of fatigue; and that where pneumonia results from gassing by CO, it is due not to direct effects of the gas on the system but to the exposure of the patient to cold at the time of or immediately after the occurrence.

A New Dyestuff

SOLWAY Blue AS is an addition to the I.C.I. range of fast-to-light Solway dyestuffs. It yields pure blue shades of very good fastness to light, perspiration and salt water. It is suitable for dyeing all forms of woollen materials but, on account of its very good level-dyeing properties and light fastness, is of particular interest for the dyeing of piece goods. Because of its very good fastness to salt water, water and light, Solway Blue AS is of value for the dyeing of yarns for the bathing costume trade, either as a self colour or in combination. In addition, it is suitable for all purposes where acid dyestuffs possessing good fastness to perspiration are required. It penetrates wool and fur felt readily and is suitable for dyeing hat bodies made of such materials. In the dyeing of silk it yields shades which exhibit the same high standard of light fastness as those produced on wool.

Metric Units of Volume

The Millilitre

THE Chemical Division Council of the British Standards Institution has decided that in all British Standard Specifications prepared for use in the chemical industry in which reference to metric units of volume is made, the unit to be employed shall be the millilitre (abreviation ml) in preference to cubic centimetres. For example, the millilitre has been adopted as the unit in terms of which British Standard volumetric glassware shall be calibrated, and as the unit to be employed in the description of analytical methods

A similar recommendation was made by the joint committee for the standardisation of scientific glassware in 1924 and has since been adopted in many important publications. Some journals, however, still retain the use of "c.c." The British Standards Institution considers that the general use of the millilitre in all journals is highly desirable.

The relevant facts are outlined in a Report (B.S. 501.—1933) just issued by the British Standards Institution, 28 Victoria Street, London, S.W.1 (2s. 2d. post free.)

Key Industry Duty

Articles Exempt until December 31

THE question of the renewal of the Safeguarding of Industries (Exemption) No. 1 Order, 1932, No. 2 Order, 1932, No. 1 Order, 1933, and No. 2 Order, 1933, made under Section 10 (5) of the Finance Act, 1926, is now under consideration by the Board of Trade. The articles covered by these Orders, which exempt them from duty until December 31, 1933, are:—

Acid adipinic; acid isobutyl allyl barbituric; acid carbolic (synthetic) [phenol (synthetic); benzo-phenol (synthetic)]; acid oxalic; acid propionic; amidopyrin (pyramidon; dimethylamidoantipyrine); ammonium perchlorate; amorphous carbon electrodes over 3 ft. long, the cross-section of which exceeds 12 inches in both length and breadth, with longitudinal slots exceeding 2 inches in width and 4 inches in depth; barbitone (veronal; malonal; malourea; acid diethyl barbituric; diethylmalonylurea; hypnogen; deba); bromural (dormigene) butyl methyl adipate; calcium gluconate (calcium glyconate); celtium oxide; chinoline (quinoline); chinosol; cocaine, crude; dial (acid diallyl barbituric); dicyandiamide; didial (ethyl morphine diallyl barbiturate); dimethyl sulphate; diphenyl; diphenyl oxide; dysprosum oxide; elbon (cinnamoyl para oxyphenol urea); erbium oxide; ethyl abietate; ethyl cellulose; ethylene bromide; eukodal; europium oxide; furfurol; gadolinium oxide; germanium oxide; glycol ethers; guaiacol carbonate (duotal); holmium oxide; integrators (planimeter type); R. lead acetate); lead tetroethyl; lipoiodin; lutecium oxide; mercury vapour rectifiers having mercury cathodes; metaldehydé; methyl cellulose; methyl cyclohexanol methyl adipate; methyl sulphonal (diethylsulphonemethylethylmethane); trional); methylene chloride; neodymium oxide; nickel hydroxide; oxymethyl paraoxyphenyl benzylamine methyl sulphate; papaverine; phenazone (antipyrine; phenyl dimethyl-pyrazolone; analgesin; anodynine; dimethyl oxychinizin); phenetidine; para-; phloroglucine; photogravure screens (both rulings on one plate) exceeding 40 inches in length; phytin; piperazine (diethylene-diamine; dispermin); planimeters; R. potassium chlorate; potassium ethylxanthogenate (potassium xanthogenate); potassium guaiacol sulphonate (thiocol); R. potassium hydroxide (R. potassium caustic; R. potassium hydrate); R. potassium permanganate; praseodymium oxide; pyramidon-veronal; quinine ethyl-carbonate; radium compounds; salol (phenyl salicylate); samarium oxide; scandium compounds; sodium ethyl methyl butyl barbiturate; strontium carbonate; strontium nitrate; styrcaol (guaiacol cinnamate); sulphonal; synthalin; terbium oxide; thulium oxide; urea (carbamide); vanadium-silica compounds specially prepared for use as catalysts for sulphuric acid manufacture; ytterbium oxide; yttrium oxide.

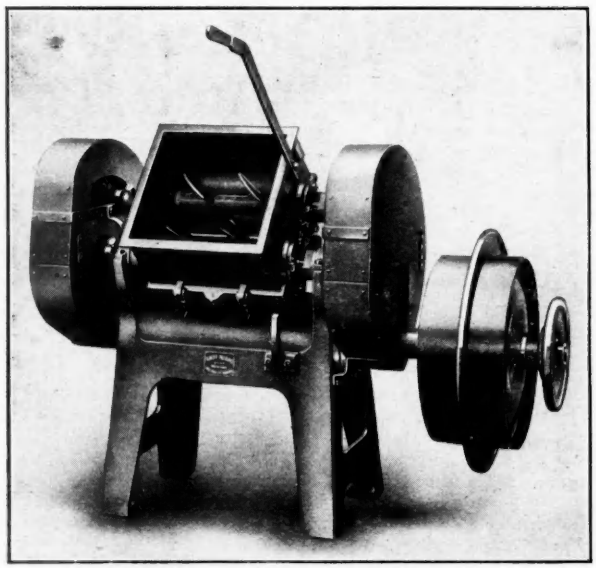
Any communication should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, S.W.1, by October 12.

COMPLETE indifference to moisture and improved general durability are advantages claimed for a recently patented compositon (Austrian Pat. 130,460) the ingredients of which are 30 parts red phosphorus, 10 parts antimony trisulphide, 2 parts manganese dioxide, 3 parts carborundum, 4 parts umber, and 40 parts of a 10 per cent. solution of para-rubber in benzene. After allowing the solvent to evaporate until a slightly moist mass remains, the latter is pressed into sheets from which the remaining traces of benzene are removed by drying at 40°C.

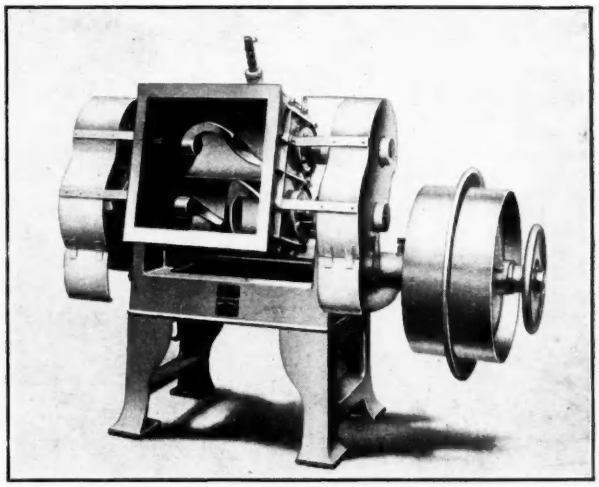
"Universal" Mixing and Kneading Machinery

Eliminating Guesswork

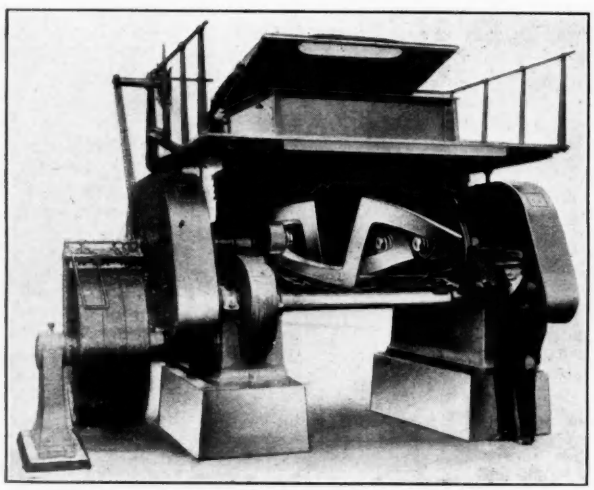
GUESSWORK in mixing and kneading was eliminated many years ago by the invention of the "Universal" mixing and kneading machine, which is built on a foundation of sound scientific principles. Nearly 50,000 of these machines are now giving absolute satisfaction in almost every conceivable industry the world over. The development of all those industries in which mixing, kneading or masticating is required, such as the manufacture of chemical compounds, rubber products, plastics, artificial silk, etc., has been largely made possible by the successful experimental research of Baker, Perkins, Ltd., by whose courtesy the accompanying illustrations are reproduced.



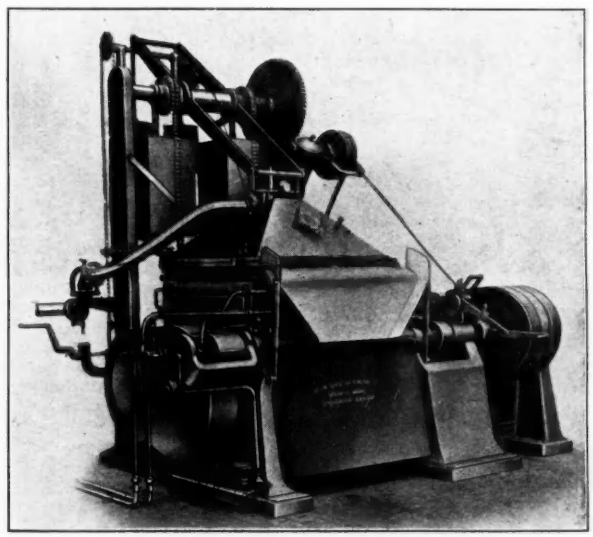
Standard "Universal" Mixer with reversing gear and hand tilting lever.



Standard "Universal" Mixer with reversing and screw tilting gear.



Large "Universal" Mixer for cellulose acetate.



"Universal" Mixer constructed for mixing under vacuum.

The peculiar mixing and kneading blades of the "Universal" mixers (which are of different types and setting, according to the materials to be treated) revolve at unlike speeds in two hollow semi-cylinders, intersecting in each revolution every point successively on the trough surface, whilst the junction of the two semi-cylinders forms a saddle-piece on which the ingredients are continually blended and mixed; the effect is to produce a perfectly homogeneous mixing of the materials. Due to this accuracy and efficiency of design, for a given size of trough, the quantity treated, the time of treatment, and the relative horse-power, are considerably more favourable than in any other type of machine. The standard construction is a trough made up of a sheet-steel wrapper, bolted to cast-iron ends and blades of steel alloy, with trough interior and blade surfaces carefully ground and polished to a fine clearance. The complete unit is mounted upon a substantial cast-iron stand in such a manner that the operations of charging and discharging can be easily and quickly effected.

Speeds of blades, gearing and designs of drive are fitted to meet the requirements of different propositions. Special constructions are made for particular operations, such as the introduction of teasing or tearing blades for the pulping of paper, the shredding process in the manufacture of alkali cellulose, etc. Arrangements can also be provided for the control of the mixing operation.

Chemical Industry Lawn Tennis Tournament

Winners of The Chemical Age Cups

THE finals of the third annual Chemical Industry Lawn Tennis Tournament, arranged by THE CHEMICAL AGE, were played on September 16 at The Toll Gate, College Road, Dulwich, by the kind invitation of Johnson, Matthey and Co., Ltd., 73/82 Hatton Garden, London. Delightful rural surroundings, ideal summer weather, good tennis and cordial hospitality combined to make the occasion a thoroughly enjoyable one, and all the awards presented at the close of play—including the smaller cups for the runners-up—were well deserved. THE CHEMICAL AGE silver challenge cup for the singles was won by C. G. Copp (Doulton and Co., Ltd., Lambeth), who defeated R. C. Pennington (J. Crosfield and Sons, Ltd., Warrington) by 7—5, 1—6, 6—2, 6—3. In the doubles, F. G. Hawley and J. Haines (Anglo-Persian Oil Co., London) secured THE CHEMICAL AGE doubles cup by defeating R. C. Pennington and R. George (J. Crosfield and Sons, Ltd., Warrington) by 6—3, 7—5. The winners, in addition to holding the challenge cups for one year, each won outright one of the three "Invicta" cups presented by Thomas Hill-Jones, Ltd., and the runners-up each received one of the three "Lloyd Willey" cups presented by Mr. W. Lloyd Willey, of Thomas Hill-Jones, Ltd.

The tournament, which was inaugurated in 1931, has grown in popularity each year and was extended this year to include men's singles as well as men's doubles. The entries for 1933 comprised 34 pairs (30 from the London area and four from the provinces) and 44 singles (37 from London and seven from the provinces). Of the 76 individual players who participated in the tournament twenty competed this year for the first time. A total of 76 matches were arranged in the course of the season, of which only eight had to be scratched.

The Singles Final

In the singles match between R. C. Pennington (J. Crosfield and Sons) and C. G. Copp (Doulton and Co., Ltd.), the players were fairly well matched and they provided some really good tennis with fast driving and thrilling rallies. An even balance was maintained throughout the first set. In the first six games both players won their service games. Copp secured the opening game of the set, losing only one point, then Pennington gained the second game, conceding two points to his opponent, and the third game went to Copp, with one point against him. In the fourth game the score reached deuce for the first time. The sixth game provided a much harder struggle and finally went to Pennington after returning to deuce five times. The score was now level at 3—3. Copp lost his next service and another game was recorded in Pennington's favour, giving him the lead and service at 4—3. Pennington, however, also failed to secure his service game and the score was again level at 4—4. Then followed a love game to each player, raising the score to 5—5. Pennington gained only two points in the next game. With the lead in his favour, Copp easily secured the next four points giving him the first set at 7—5.

Copp slackened his pace in the second set and Pennington, therefore, had a fairly easy win, gaining the first three games with the loss of only one point. Copp took the fourth game but Pennington maintained his good lead and won the next three games, which gave him the set at 6—1.

A Strenuous Fight

In the third set Copp regained the form he had exhibited in the first set, and took the first three games, losing one point in each of the first and third games, the second game running to deuce three times. Pennington then secured the fourth game, conceding two points to Copp. The score was brought to 4—1 in Copp's favour in the next game, after which Pennington quickly took a love game off Copp's service. The lead, however, was still in Copp's favour at 4—2. It was now Pennington's service and he put up a strenuous fight, but after countless rallies and deuce four times he lost and Copp still held the lead, the score being 5—2. Copp dropped only one point in the next game, which gave him the third set at 6—2.

Pennington made a splendid opening in the fourth set by pulling off two games, with the loss of only three points, but after reaching deuce the next game was recorded in Copp's favour. With three points against him, the following two games were also to Copp's advantage, giving him the lead at 3—2. Pennington gave away only one point in the sixth game and for the seventh time during the match there was a level score. The games stood at three each and Pennington had the advantage of service, but he captured only two points in the next game, and Copp had the lead at 4—3. This he quickly took to 5—3, and although Pennington fought vigorously to the end the points were in Copp's favour and the latter took the set at 6—3, thus winning the match two sets to one.

The Doubles Match

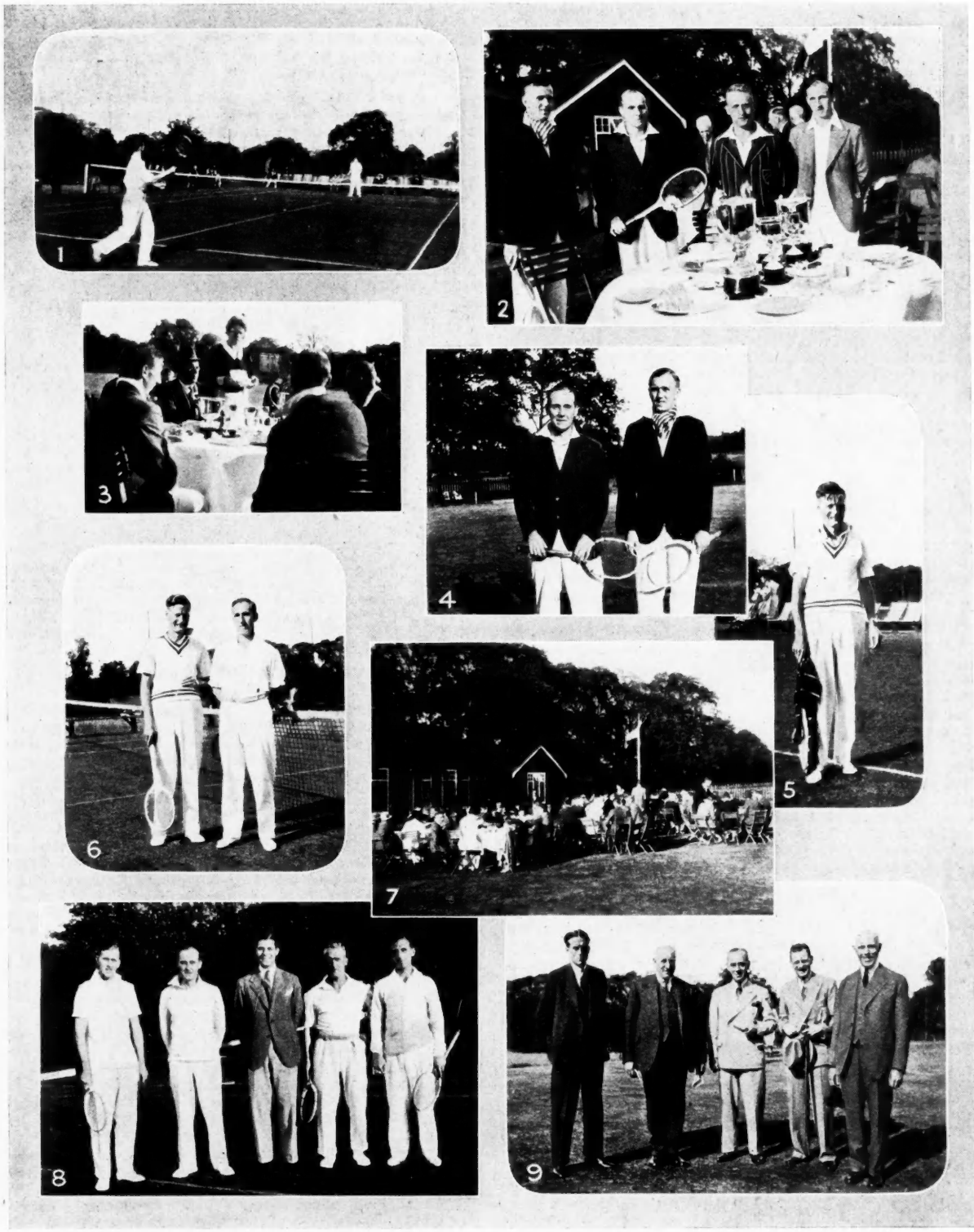
The doubles match between F. G. Hawley and J. Haines (Anglo-Persian Oil Co.) and R. C. Pennington and R. George (J. Crosfield and Sons, Ltd.), did not provide the continued tenseness of the singles match, but was nevertheless an enjoyable game, and at intervals was even more thrilling than the singles. From the first few games it was obvious that Hawley and Haines were the stronger couple. Pennington and George, however, put up a good fight and it was by no means an easy win for Hawley and Haines, especially in the second set when nearly all the games ran to deuce, and at one time Pennington and George were leading 5—3. Both Hawley and Haines had fast services, which won outright for them many points. Haines got in some fine back-hand drives across the court and there was some good volleying with all four players performing at the net. Hawley and Haines's winning shots down the side lines found Pennington and George out of position on several occasions. The doubles match opened with George's service which he won after one deuce. The second game was slightly longer, going twice to deuce and was taken by Hawley and Haines. Pennington and George proceeded to 2—1, conceding two points to their opponents. With Hawley's service the score was levelled to 2—2. After ten points the next game gave Pennington and George the lead at 3—2, but Haines's service soon brought them to 3—3. Up to this point each player had successfully scored on service, but in the seventh game Pennington and George broke the record, secured only one point, and gave the game and lead to their opponents at 4—3. The play slowed down a little, and the eighth game appeared to be an easy win for Hawley and Haines. After two deuces the ninth game gave Hawley and Haines the first set at 6—3.

A Close Finish

The second set provided some of the most exciting play of the afternoon. There were some thrilling struggles with all four players at the net, the ball passing to and fro until a terrific "kill" or a nicely placed shot won the point. The first two games ran to 14 points each and were taken respectively by Pennington and partner and Hawley and partner. Hawley unexpectedly went down on his next service, giving Pennington and George the lead at 2—1. Another prolonged struggle of 14 points was won by Pennington and George, putting them two games ahead at 3—1. They dropped back a little in the next game, gaining only one point from Haines's service, making the score 3—2. Pennington and George took the sixth game, bringing the score in their favour to 4—2. Hawley was in fine form on his next service and scored a love game. Another keen contest running to 14 points gave Pennington and George the lead of 5—3. Their chances of winning the set, however, gradually diminish as the next game was taken by Hawley and Haines with only two points in favour of Pennington and George. Then another game without the loss of a single point went to Hawley and Haines and levelled the score to 5—5. With still just a chance of putting the set in their favour Pennington and George went all out in the next game and a struggle running to 18 points, the longest of the match, closed in favour of Hawley and Haines. An easy final game, without the concession of a single point to their opponents gave the set and match to Hawley and Haines.

While the three winners did well throughout the tournament, the progress of the two Warrington players was per-

Some Snapshots at Dulwich



1. The start of the singles final between C. G. Copp and R. C. Pennington.
2. The players in the doubles final, with the eight cups.
3. Mr. Gordon Robbins at tea with the players.
4. F. G. Hawley and J. Haines (Anglo-Persian Oil Co.), the winners of the doubles.
5. C. G. Copp (Doulton and Co.) who won the singles.
6. On the court before the start of the singles final.
7. The tea interval.
8. Mr. J. Shaw, the umpire, with the winners and runners-up of the doubles.
9. The organisers with Mr. W. Lloyd Willey (second from left) and Mr. D. McDonald (extreme right).

haps the more spectacular in view of their meetings with those who had distinguished themselves in 1932. In the first round they defeated the cup-holders, S. E. Chaloner and W. Speakman (Monsanto Chemical Works, Ltd., Ruabon), and in the semi-final they accounted for last year's runners-up, L. Giltrow and G. F. Hammond (Williams, Hounslow, Ltd.). In the singles, Pennington also beat Speakman in the first round, while George, who had a walk-over in the first round defeated I. Williams, another Ruabon player, in the second round. A feature of note in regard to the winners of the doubles is the fact that Hawley and Haines did not lose a set throughout the tournament, although in their third round match their score in both sets went to 7—5.

In the interval between the two matches the players and close upon one hundred guests were entertained to tea by Johnson, Matthey and Co., Ltd.

At the close of play Mr. GORDON ROBBINS, deputy-chairman of Benn Brothers, Ltd., publishers of THE CHEMICAL AGE, presented the cups to the winners and runners-up. Mr. Robbins, who had hastened back from holiday in order to witness the finals, warmly congratulated the players upon the high standard of their play and commiserated with the runners-up upon their failure to take either of the challenge cups home to Lancashire after putting up such a good game. On behalf of THE CHEMICAL AGE and all who had been privileged to attend the finals he thanked Johnson, Matthey and Co., Ltd., for placing the courts at the disposal of the finalists and for their hospitality in entertaining all the guests to tea in such attractive surroundings. He also acknowledged the gifts of the smaller cups from Thomas Hill-Jones, Ltd., and from Mr. W. Lloyd Willey, and paid a well-merited tribute to Mr. J. Shaw, of Johnson, Matthey and Co., Ltd., who acted as umpire for both matches.

Mr. DONALD MCDONALD, on behalf of Johnson, Matthey and Co., Ltd., said it had given both the company and the Johnson Matthey Athletic Club, of which he was chairman, great pleasure to welcome the visitors to Dulwich. Unforeseen circumstances had prevented the attendance of several members of the board who had hoped to be present, but he had been asked to convey their regrets and good wishes to all who had attended.

Mr. W. LLOYD WILLEY, speaking for Thomas Hill-Jones, Ltd., and himself, said he hoped the recipients of the cups would find as much pleasure in accepting them as he and his firm had in giving them. He also announced his desire to offer equally acceptable awards for the 1934 tournament.

Mr. C. G. COPP, the winner of the singles, expressed thanks to Mr. A. C. Cross, Editor of THE CHEMICAL AGE, and the staff for organising the tournament, and Mr. CROSS briefly responded.

Developments in Fuel Technology in 1932

The Fuel Economy Review

AN annual publication by the Federation of British Industries, the "Fuel Economy Review" (2s. 6d.) is issued with a view to reporting developments in all branches of fuel technology, and, as a note on the title-page points out, is "an attempt to disseminate knowledge and information on all points concerned with efficient fuel utilisation, and as such what may be regarded as *ex-parte* articles may appear from time to time."

A further indication of the purpose of the "Fuel Economy Review" may be gained from the editorial note, which states that publicity and propaganda are being used unwisely and occasionally leading the country into very unfortunate positions. This is not confined to commercial propaganda such as "eat more everything" campaigns, but stretches into the fields of national policy, particularly that of power provision. The publicity given to the fuel oil question may have one good effect, if it directs the minds of those catering for industrial energy requirements to the reasons which have been responsible for the definite advance of oil as an industrial source of power. It is not sufficient for energy suppliers to be content with the delivery alone, they must attach a further service, namely, that dealing with the best methods of utilisation which will necessitate research work.

Widening Gas Utilisation

The gas industry, from the domestic point of view particularly, has realised this for some years and so played a very prominent part in widening gas utilisation. The electrical industry has established an organisation on the same basis and now we have established a Coal Utilisation Council. It is hoped that this latter body will develop not by creating propaganda which would tend to limit technical advancement but by a directional propaganda towards improving the marketing of coal and its utilisation which is the most effective way of meeting the competition from alternative supplies.

The development of low temperature carbonisation last year is discussed by F. S. Sinnatt, D.Sc., who mentions briefly the activities of such concerns as Low Temperature Carbonisation, Ltd., Illingworth Carbonisation Co., Ltd., Salermo, Ltd., and also reports the progress of the Turner and Maclaurin processes.

Mr. R. A. Mott, M.Sc., writing on "The Advantages of Clean Coal to Industry" summarises his article by stating that there are few industrial uses in which coal of low-ash content is not preferable to high-ash coals. In all cases transport charges have to be paid on the dirt in the coal, the ash in the coal has to be "processed" in the same way as the combustible coal in that process may adversely influence the efficiency of the use of the coal, and finally, the ash has to be collected and disposed of, incurring a charge which amounts to 0.6d. per 1 per cent. of ash per ton of coal in small scale operations. The major influence is, however, that each 1 per cent. of ash, as 1½ per cent. of shale, gives 1½ per cent. less coal which, at an average charge of 14s. per ton, is 2.5d. Each 1 per cent. of ash requires an increase in plant capacity by at least 1½ per cent., and reduces the efficiency with which the coal is used. The value of only 1 per cent. ash reduction is worth at least 4d. per ton to the consumer.

Organic Products from Gas

In reviewing gasworks practice during 1932, Mr. H. D. Greenwood, of the South Metropolitan Gas Co., mentions the problem of the disposal of coke oven gas, which in France and Germany has concentrated attention on the manufacture of organic products from the constituents of the gas. He states that so far, the main products are ammonia and methanol, both of which enter an over-saturated market; by the extraction of ethylene, ethyl and higher alcohols are obtained, the separation of the latter resulting in good yields of acetone. At the moment, despite the obvious facilities which the gas industry possesses for the manufacture of such products, there is insufficient demand to justify large scale operations of this nature. Mr. Greenwood continues with an exhaustive survey of all branches of the industry, and gives a very readable presentation of knowledge which has been published from time to time during the past year.

Other articles of importance in the "Fuel Economy Review" are by Mr. E. C. Evans, writing on organisations for fuel control and economy in the British iron and steel industry; "Some Problems of Furnace Heating Practice," by Sir Robert Hadfield and Mr. R. J. Sarjant, and "Drying by Means of Heated Air," by Mr. J. Sharpley Jones, of the Carrier Engineering Co., Ltd. The ceramics industry will be interested in an account of fuel economy research by Mr. J. A. Audley, and "Recent Developments in Foundry Melting Practice" is contributed by Mr. J. E. Fletcher, M.I.Mech.E.

"Industrial Uses of Town's Gas," by C. M. Walter, D.Sc., is an interesting account of the increased use of heavy vehicles fired by town's gas, with information regarding the performance and methods of operation.

Since the publication of this valuable review only occurs once annually, there is small likelihood that any of the problems relating to fuel economy will be left untouched, and although, as we have already mentioned partiality may occasionally appear, the F.B.I. does a great service to its members by stimulating interest in and suggesting solutions to problems which affect them all.

Scientific Salesmanship

Views of Dr. E. F. Armstrong at the B.A. Meeting

SPEAKING in a discussion in Section F (Industrial Co-operation) at the British Association in Leicester on September 7, Dr. E. F. Armstrong, F.R.S. mentioned that a meeting of the VIth International Congress for Scientific Management will be held in London in the week beginning July 15, 1935, under the presidency of Sir George Beharrell and that H.R.H. the Prince of Wales has kindly consented to act as honorary president of the Congress. Among the general questions to be discussed are (1) the position of scientific management in small or medium sized works with particular reference to the part associations can play in its promotion; (2) budgetary control of production; (3) questions affecting distribution in manufacturing, wholesaling and retailing; (4) training, with particular reference to the supply of men for the larger commercial undertakings and public administration; and (5) agriculture, the part standardisation of plant, products, etc., can play in agricultural economics.

Dr. Armstrong expressed the opinion that there is an opportunity for the application of scientific methods to salesmanship. In the works during the last decade or more, science had effected many changes for the better and it would be true to say of not a few industries that their technical efficiency is near a maximum and that it will not be very much increased in the near future or at any rate that these industries have more pressing problems to solve in other directions. There were, of course, some other industries in which there is still great scope for technical progress and new industries will constantly arise for development. In the main, however, it was on the selling side that there is most to be done. Modern salesmanship had to some extent been satisfied by graphs showing an increasing volume of sales accompanied by an increase of overhead costs though the burden of these per unit sale has been diminished. The corresponding profit and loss curve, however, had often been lost sight of by the salesman; it should be shown on the same graph, for it was the final arbiter of success.

Competition had become so very keen in domestic markets and still more so in export markets that the salesman and those at the head of affairs had found it necessary continually to lower prices in order to effect any sales so as to keep the works going. The repercussion of this had been felt by every competitor and its effect was cumulative. It might at least be suggested that in the long run the orders were divided among the chief competitors and that the same division might have been effected at considerably higher, and therefore, more remunerative prices, had common sense prevailed at the outset and the competitors found it possible to come to some agreement on a quota basis. The attempt seemed to be well worth making; that the task was a difficult one it would be futile to deny, but it was so necessary that industry should be carried on at a profit and that the limited work available should be shared, that no selfish consideration should be allowed to dominate what had now become world problems. All salesmen and most buyers would welcome controlled prices. The actual price often did not matter so much to a buyer as the fact that a competitor might buy at a lower price. It was bad policy for the industrial nations to undersell one another to an extent which amounted to a subsidy of the smaller nations who thereby might be placed in a position, that they, in turn, were able to engage in manufacture and enter into the whirl of competition and so depress prices still further.

This Soft Age

Sir Ernest Benn's Optimistic Theory

FOR the first time in all his writings on social and political economics, Sir Ernest Benn adopts the role of the optimist in his latest book, "This Soft Age" (Ernest Benn, Ltd., 3s. 6d.), which follows at an interval of eighteen months on his last success, "Honest Doubt." In the first eleven chapters he brings up to date his views on conditions as they are to-day, and in the last four he sets forth the optimistic theory of the "30/50 man," to whom he looks for a return to that condition of security and confidence on which business and economic development relies.

Sir Ernest Benn contends that anything worth having is worth paying for, in money or in labour. Even the greatest genius trod no royal road other than that open to the rest of us—hard work with a piece of sane thinking thrown in. Before the days of the political and educational "make it easy" enthusiasts, the popular dictum had it that life is a healthy struggle, and we are encouraged to push, whereas to-day it is a case of sipping the narcotic of a vast system of public assistance offered as liquid sustenance. He diagnoses the present age as sharing with the Victorians the ideals of security, comfort, peace, but parting company in the acquiring of them. "The right to the pursuit of happiness has become the right to have it delivered free of all charges. It must also be delivered in a plain van, or at least the van must bear no mark to suggest that we owe anything to anybody for it." Least of all do we owe anything to ourselves. Self-restraint and the suppression of desires, the highest forms of happiness, the service which is perfect freedom, are beyond the comprehension of a people so soft as we moderns. "On all of which one can only reflect that the sooner harder times arrive the better for the soul and quality of the race."

In the twelfth chapter, the author arrives at the conclusion full of hope and relief that the trouble is beginning to be over, for the 30/50 man is beginning to come back, not because of world economic conferences, but by the age-long and non-political methods of nature. The year 1933 witnesses the arrival amongst us of the first batch of 30/50 men who are free, or comparatively free, of any form of war disability. This year, therefore, marks the beginning of a complete change of mental attitude of all of us, for, notwithstanding what we may say, as bright young things or as old people, we take our inspiration from the 30/50 man, we model our conduct upon him, we look to him to lead us and we know that he is our mainstay. He is no wild experimenter, he is proof against political pretensions or even professorial presumption, he is a respecter of history and a student of experience, and now for the first time since 1914 he is beginning to re-appear amongst us. Sir Ernest believes that there will be more balance, more reality, more stability in our affairs. The 30/50 man, conscious of his own strength, will not need to fall back on the comforting stupidity to which we weaklings have been driven. He will scornfully reject the idea of "no fault of our own" and all the political folly that goes with it.

"Democracy," he concludes, "was conceived as a way of destroying tyranny, not of extending it, and democracy will only survive if it returns to its original purpose."

The League of Industry

Next Week's Annual Conference at Buxton

MORE than 1,000 representatives of employers and workers will attend the second annual conference of the League of Industry, under the presidency of Sir William Morris, at Buxton from September 29 to October 1. The league, which includes branches representing the chemical industry, dyeing and bleaching interests, has a membership of 180,000 men and women, and there are now 2,000 branches in factories, works, and other industrial establishments. Sir Wyndham Portal, chairman of the league, will open the conference, and Sir William Morris will reply to an official welcome on the second day by the Mayor of Buxton. A civic reception, followed by an industrial pageant and dance, will be held that even. There will also be an exhibition of British industry.

News from the Allied Industries

Beet Sugar

BRITISH SUGAR MANUFACTURERS, LTD., in their report for the year ended March 31, state that the factory at Wissington worked satisfactorily and economically during the past season, and a profit was made from the production of sugar from home grown beet, despite the low price for the commodity prevailing during the period. The company received 114,832 tons of beet (compared with 110,239 tons in the previous year, from which 16,132 tons of raw sugar was produced (against 16,182 tons) The total amount paid to growers was £240,308, the average payment being at the rate of 41s. 10½d. per ton. The results of last year's refining were unfavourable by reason of the decline in sugar values and because of the unsatisfactory refining margin.

Non-Ferrous Metals

IN ANNOUNCING THE INTERIM DIVIDEND on the preference capital at the full rate of six per cent. per annum, the directors of the British Aluminium Co. state that they have decided to await the full year's trading results before consideration of the payment of a dividend on the ordinary share capital. This policy was adopted a year ago.

THE COPPER DEVELOPMENT ASSOCIATION has been incorporated as a company with offices at Thames House, Millbank, S.W.1. Sir Auckland Geddes, Mr. A. Chester Beatty, and Sir Harry D. McGowan are honorary presidents of the new association, which will be directed by a council, of which Mr. D. Owen Evans is chairman, and Lieut.-Colonel R. M. P. Preston is vice-chairman. The object of the association is to increase the consumption of the metal. The decision leading to its formation was taken on May 8 at a meeting in London of leading representatives of the trade, and on the initiative of the Rhodesian and Canadian copper producers.

Artificial Silk

THE EFFORTS MADE BY THE DIRECTORS of the Branston Artificial Silk Co. to prevent the sale of the freehold properties and plant at Burton-on-Trent have been successful. In the Chancery Division on Wednesday, Mr. Justice du Parcq, sitting as Vacation Judge, had before him the motion in connection with the threatened sale of the factory. Mr. R. J. T. Gibson, who appeared for the Branston company, intimated that the affidavit filed by the defendants had brought the figure to £64,421. Arrangements had been made for their debenture to be taken over and for a contract to be carried through for the sale of the shares. By various means £65,000—£500 in excess of the amount mentioned in the affidavit—was lodged on Tuesday morning by the due time, in joint names of the bankers buying the shares and the defendants' solicitors. There was nothing more to be done. The sale did not take place as they were in time to stop it, and they had agreed that there be no order on the motion, the defendants' costs to be agreed or taxed and to be added to their security. They were not staying all proceedings, as his friend could not see his way to do that. Mr. Justice du Parcq sanctioned the arrangement. It will be recalled that the Alliance Assurance Co. held a charge on the company's assets to secure a loan of no more than £50,000 and interest thereon. The total amount due on April 30 last was £57,787, and as the company was unable to repay the loan, the mortgagees had instructed the receiver to offer the property and plant for sale by auction. The sale was to have taken place on September 19, but it was abandoned, the auctioneer announcing that the company had handed a cheque to the receiver for the full amount due to the Alliance Assurance Co. As the Branston property is free from all charges except to the Alliance Assurance Co., the settlement of the latter's claim will be followed by the discharge of the receiver. There is therefore a good prospect that it may soon be possible to resume operations. Further working capital will be required, however, but whether that can be obtained depends upon the response made by the shareholders to the invitation to subscribe for five-year interest-bearing notes of £20 each. These notes will carry interest at the rate of 5 per cent. per annum and will be repayable at £22 10s. each.

Carbonisation

BUILDING HAS BEGUN on the premises of Huddersfield Collieries, Ltd., Lepton, in connection with the coal carbonising plant which British Coal Refining Processes, Ltd., are to erect there. This plant will be the first of its kind to be set up to exploit the Salerni system of low temperature carbonisation. It is not likely to be in normal production until after Christmas.

A CONFERENCE IS TO BE HELD at Wrexham next week between representatives of the North Wales Coal Owners' Association and the East Denbighshire Industrial Organisation to consider a proposal to establish a £32,000 plant for the low temperature carbonisation of North Wales coal. This coal has been declared eminently satisfactory for the purpose by the Fuel Research Board, and a scheme is now being prepared by a special technical sub-committee of the East Denbighshire Industrial Organisation.

Rubber

DAMAGE AMOUNTING TO SEVERAL THOUSANDS OF POUNDS was caused by a fire which destroyed Brimelow's tyre depot in Manchester Road, Bolton, on September 14. Dense clouds of smoke from the burning tyres enveloped the district. Valuable plants was destroyed. The fire, the cause of which is unknown, originated in the basement, and was seen by passers-by, who endeavoured unsuccessfully to break down the doors.

DUTCH RUBBER INTERESTS are advocating a 50 per cent. restriction of rubber production for the year 1934 and the fixing annually of the restriction percentage for future years by a commission, according to a local newspaper. The Dutch East Indies Government is reported to favour the restriction of native rubber production by means of an export duty *ad valorem*. Such a restriction scheme would remain in force for five years, and fresh planting of rubber would, in the meantime, be prohibited.

China Clay

THE CHINA CLAY SHIPMENTS for August reveal a further steady improvement and the figures of the aggregate tonnage dealt with justify the optimism that is prevailing throughout the industry. Shipments at Fowey were 38,818 tons of china clay (an increase of 8,144 tons on the previous month of July and 8,562 tons compared with July, 1932), to 1,470 tons of china stone and 1,453 tons of ball clay, making a total despatch of 41,741 tons against 32,820 tons in July, 1932. The local port at Par again exceeded the previous month's shipping with 10,110 tons of china clay and 1,171 tons of china stone. Other figures are :—Charlestown, 4,709 tons of china clay and 608 tons of china stone; Looe, 602 tons of china clay; Plymouth, 191 tons of china clay; Newham, 57 tons of china clay; by rail throughout, 3,901 tons of china clay, making a total for August of 58,388 tons of china clay, 3,249 tons of china stone, and 1,453 tons of ball clay. The figures for July were 52,541 tons of china clay, 3,785 tons of china stone, and 1,859 tons of ball clay. Although these increased shipments may not represent any startling jump to prosperity yet when compared with last year it is distinctly encouraging. In many works clay workers are returning to their old jobs and it is hoped that the industry is at last climbing out of the depression that has afflicted it for the last three years.

VARIATIONS in the colour of certain metallic iodides such as those of cobalt and lead have been found to be applicable to temperature measurements with a fair degree of accuracy for certain points over the range of 35° to 300° C. Preparations, comprising mixtures of halides whose successful working depends upon the presence of an abnormally high proportion of water of crystallisation, are described in a recent issue of the "Oesterreichiesche Chem.-Zeit.," 1933, page 83. Readings are accurate to within 3° to 5° C. For convenience in handling, the preparations are bedded in cellulose acetate film. Some proposed uses are in connection with sterilising and pasteurising apparatus, ball bearings and motor car radiators.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Stabilising Gasolene

GUMMING and discolouration of fuel hydrocarbons, according to Specification No. 388,826 of E. I. Du Pont de Nemours and Co., W. S. Calcott and H. W. Walker, can be retarded by the addition, in absence of iron carbonyl or of ketones or alkyl ethers, of one or more secondary aryl amines of the type Ar-NH-R where Ar is a hydrocarbon of the benzene series, and R is an aliphatic, aromatic, or aromatic-aliphatic hydrocarbon radical other than a naphthyl group. Specified additions are 0.001-0.1 per cent. by weight of methyl-aniline, ethyl-aniline, diphenylamine, 4-anilino-diphenyl, 2-methyl-diphenylamine, ditolyl-amines, and dixylyl-amines to cracked gasolene.

Chlorinated Hydrocarbons

CHLORINATED derivatives of benzene are obtained by passing a mixture of benzene or a partially chlorinated benzene and chlorine through a reaction zone at a temperature of 375-700° C., the space velocity employed, according to Specification No. 388,818 of T. S. Wheeler and Imperial Chemical Industries, Ltd., being less than 100 reciprocal minutes when working in the temperature range 650-700° C. Catalysts, such as the well-known chlorine carriers, iodine, aluminium chloride and ferric chloride may be used. In examples chlorine and benzene or monochlorbenzene are led through a silica tube at varying temperature and space velocities yielding mixtures containing mono-, di- and trichlorbenzene; at temperatures above 500° C., chlorinated diphenyls are also obtained. Specification 342,329 is referred to.

Antimony Trifluorodichloride

ANTIMONY trifluorodichloride is prepared by interacting chlorine with antimony trifluoride. The reaction may take place in a metal vessel, *e.g.*, a revolving ball-mill, and at a temperature preferably above 70° C. The product may be employed as a fluorating agent for halogen derivatives of aliphatic hydrocarbons, with the additional production, for example, of antimony pentachloride. Thus, on heating together equimolecular proportions of hexachlorethane and antimony trifluorodichloride, two, three or four chlorine atoms of the hexachlorethane are substituted by fluorine atoms. To obtain a preferred fluorated compound, dephlegmation and control of the reaction products may be employed. (See Specification No. 389,619, of Frigidaire Corporation.)

Sodium Silicate Detergents

READILY soluble sodium silicate for use as a detergent is obtained by heating silica such as quartz sand with soda lye up to temperatures at which the temporarily pasty mass crumbles to powder, say, to 220-230° C. Heating may be effected in a stirring apparatus or in an internally heated rotary drum and residual moisture be removed by continued heating up to 250-300° C. The solid product which contains 10-15 per cent. of free caustic soda may be dissolved in water, freed from residue, and be concentrated or spray-dried to give a completely soluble mass, or from the solution freed from residue sodium metasilicate may be obtained by cooling. Detergents having disinfectant properties may be obtained by mixing the solid product with solid calcium hypochlorite or by chlorinating the solution obtained therefrom. (See Specification No. 391,407, of I. G. Farbenindustrie.)

Specifications Accepted with Dates of Application

CELLULOSE DERIVATIVES AND PRODUCTS OBTAINED THEREFROM.—British Celanese, Ltd. Dec. 18, 1930. 398,192.

PROCESS OF DYEING.—Imperial Chemical Industries, Ltd., C. H. Barlow and L. G. Lawrie. Dec. 31, 1931. 398,175.

ANTHRACENE AND ANTHRAQUINONE DYESTUFFS.—Imperial Chemical Industries, Ltd., F. Lodge and C. H. Lumsden. Jan. 29, 1932. 398,161.

MERCAPTO COMPOUNDS OF THE ANTHRAQUINONE SERIES.—Imperial Chemical Industries, Ltd., F. Lodge and C. H. Lumsden. Jan. 29, 1932. 398,162.

DYEING PROCESS.—Imperial Chemical Industries, Ltd., M. Mendoza and W. A. Sexton. Jan. 29, 1932. 398,163.

MANUFACTURE OF THERMOPLASTIC RESINOUS MATERIALS.—Imperial Chemical Industries, Ltd., and A. Renfrew. Feb. 29, 1932. 398,194.

PROCESS FOR PRODUCING VALUABLE DERIVATIVES FROM PHENOLS.—Standard Oil Development Co. March 12, 1931. 398,218.

LIQUID FUELS.—E. I. Du Pont de Nemours and Co., F. B. Downing and H. W. Walker. March 7, 1932. 398,219.

UTILISATION OF NITROSYL CHLORIDE.—Kali-Forschungs-Anstalt Ges. July 4, 1931. 398,187.

MANUFACTURE OF LAMINATED NON-SPLINTERING GLASS.—Imperial Chemical Industries, Ltd., J. S. B. Fleming and A. Renfrew. March 7, 1932. 398,189.

SYNTHETIC ASPHALT BEING A COMPOSITION OF EITHER BITUMEN, SAND, AND LIMESTONE DUST, OR BITUMEN AND LIMESTONE DUST.—E. W. Harvey and H. F. Weatherley. March 19, 1932. 398,268.

PRODUCTION OF COLOURED CELLULOSE DERIVATIVES.—R. Dinklage. April 18, 1931. 398,279.

MANUFACTURE OF VINYL COMPOUNDS.—H. Dreyfus. Feb. 1, 1932. 398,173.

PROCESS OF, AND APPARATUS FOR, THE PRODUCTION OF MOULDED ARTICLES FROM ARTIFICIAL RESINS AND ARTIFICIAL RESIN-CONTAINING MIXES.—P. Kopp. Dec. 22, 1931. 398,330.

JOINT PRODUCTION OF HYDROGEN PEROXIDE AND SOLUBLE BARIUM SALTS FROM BARIUM PEROXIDE.—Kali-Chemie Akt.-Ges. May 7, 1932. 398,399.

PRODUCTION OF SILICOFLUORIDES.—Brander Farbwerke Chemische Fabrik Ges., and E. G. Abel. Feb. 14, 1933. 398,403.

CONVERSION OF FERRO-PHOSPHORUS INTO USEFUL PRODUCTS.—W. J. Tennant (Victor Chemical Works). March 28, 1933. 398,437.

Complete Specifications Open to Public Inspection

PROCESSES FOR FACILITATING THE PENETRATION OF LATEX INTO TEXTILE MATERIALS.—L. S. M. Lejeune and J. E. C. Bongrand. March 7, 1932. 21498/32.

DYEING OF WOOL.—Soc. of Chemical Industry in Basle. March 9, 1932. 6919/33.

PROCESS FOR THE MANUFACTURE OF UNSATURATED KETONES.—Schering-Kahlbaum Akt.-Ges. March 11, 1932. 7097-7100/33.

SENSITISING SILVER HALIDE EMULSIONS.—I. G. Farbenindustrie. March 10, 1932. 7335/33.

PROCESSES FOR THE PREPARATION, SEPARATION OF PURIFICATION OF SALTS, SALT SOLUTIONS, AND OTHER SOLUTIONS.—Dr. G. Austerweil and C. Jeanprost. Dec. 11, 1931. 24577/33.

Applications for Patents

MANUFACTURE OF COLOURING MATTERS.—British Celanese, Ltd., F. Brown and G. H. Ellis. Sept. 11. 25019.

MANUFACTURE OF DYESTUFFS.—British Celanese, Ltd., F. Brown and G. H. Ellis. Sept. 11. 25080.

STORING LIQUID CARBON DIOXIDE.—Carba A.-G. Sept. 13. 25401.

MANUFACTURE OF OXYGEN-CONTAINING ORGANIC COMPOUNDS.—H. Dreyfus. Sept. 12. 25217.

MANUFACTURE OF HYDROXYBENZENES.—E. I. Du Pont de Nemours and Co. Sept. 11. 25101, 25102.

ACTIVATING CLAYS, ETC., FOR PURPOSE OF OBTAINING BLEACHING MATERIALS.—K. Endell and Posschl's Apparatebau and Export-Ges. Sept. 14. 25516.

MANUFACTURE OF CELLULOSE ACETATE SHEETS.—W. A. Grotefeld. Sept. 12. 25261.

MANUFACTURE OF POLY-HALOGEN DERIVATIVES OF PYRENE.—I. G. Farbenindustrie. Sept. 11. (Germany, Sept. 10, '32.) 25099.

MANUFACTURE OF SYMMETRICAL DI-(ARYL-AMINO)-HYDROXYBENZENES.—I. G. Farbenindustrie. Sapt. 11. (Germany, Sept. 9, '32.) 25100.

MANUFACTURE OF AZO DYESTUFFS.—I. G. Farbenindustrie. Sept. 13. (Germany, Sept. 15, '32.) 25373.

CONVERSION OF METAL SULPHIDES.—Imperial Chemical Industries, Ltd. Sept. 13. 25360, 25361.

APPARATUS FOR GASEFICATION OF FINE-GRAINED FUELS.—J. Y. Johnson (I. G. Farbenindustrie). Sept. 11. 25125.

CHLORINATION OF HYDROCARBONS.—J. Y. Johnson (I. G. Farbenindustrie). Sept. 13. 25352.

CHLORINATION OF ORGANIC COMPOUNDS.—J. Y. Johnson (I. G. Farbenindustrie). Sept. 13. 25353.

MANUFACTURE OF ADDITION PRODUCTS OF ETHYLENE.—T. Kane and E. H. Strange. Sept. 13. 25356.

PRODUCTION OF CYANINE DYES.—J. D. Kendall. Sept. 12. 25279.

ESTERS OF DICARBOXYLIC ACID, ETC.—Kodak, Ltd. Sept. 11. (United States, Sept. 10, '32.) 25134.

PYROGENETIC PRODUCTION OF HYDROCARBONS.—O. D. Lucas and E. J. Lush. Sept. 16. 25690.

CONVERSION OF METAL SULPHIDES.—I. R. McHaffie. Sept. 13. 25360.

PRODUCTION OF ALUMINIUM-SILICON ALLOYS.—Metallges, A.-G. Sept. 14. (Germany, Oct. 7, '32.) 25476.

MANUFACTURE OF HIGHER ALIPHATE TERTIARY ALCOHOLS.—W. J. Tennant (Henkel et Cie). Sept. 13. 25338.

MANUFACTURE OF HIGHER TERTIARY ALCOHOLS.—W. J. Tennant (Henkel et Cie). Sept. 13. 25366.

MANUFACTURE OF ESTERS OF DIETHYL-MALONIC ACID.—Dr. A. Wacker Ges. für Elektrochemische Industrie Ges. Sept. 12. (Germany, Sept. 12, '32.) 25225.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

APART from foreign exchange oscillations, which continue to hamper the chemical market to some extent, business during the past week has been moderately good, and prices show little change. Those industrial chemicals which have been in greatest demand lately continue strong, especially acetone, formaldehyde, and formic acid. Interest was also shown in anhydrous ammonia and sodium sulphide has been in greater demand, although there is room for further improvement in this product. The weakest items reported were arsenic, barium compounds, Epsom salts and potassium salts. In the coal tar market a gradual improvement generally is noticeable, especially in pitch, Continental inquiries being frequent. Solvent naphtha and creosote oil were also strong items. As we pointed out last week, refined tar is no longer in demand, and carbolic acid crystals have shown less activity. The demand for pharmaceutical products has shown little tendency to fluctuate, the steadiest items being aspirin, benzoic acid and sodium benzoate. More interest has been shown in phenacetin, while salicylates fail to record any improvement. Japanese peppermint has dropped in price, and following reports of a poor crop, lavender prices have been marked up. Essential oils generally are unsteady

LONDON.—The demand for chemicals generally has been well up to average and prices continue steady. There are no changes to report in the prices. There is no change to report in the coal tar products market from last week, prices remaining firm and unaltered.

MANCHESTER.—Slight easiness is still occasionally in evidence on the Manchester market for chemicals, but actual changes on balance have been slight and the general tendency is towards a continuation of the steady price conditions that have been so long a feature. Business during the past week has been a shade more active, and with the holiday season now virtually at an end sellers are hopeful of some degree of further improvement. The movement of the soda products this week has largely been against existing commitments and so far as new business is concerned orders have usually been for relatively small quantities. The demand for the potash compounds, also, with rare exceptions, has been confined to early delivery business, whilst a quiet trade has been reported in the case of magnesium carbonate and sulphate. Easiness in the non-ferrous metals continues to react on certain chemical products. A start should shortly be made with the pitch export season, and whilst some shippers have fair orders on their books only moderate additions have been made during the past week. Carbolic acid is in quietly steady demand, and a fair business is passing in toluol and certain of the light by-products.

SCOTLAND.—Buying has been steadier in the Scottish heavy chemical market, although the quantities called for show little increase. Orders placed are mostly for immediate requirements. No important change in prices has to be reported. With regard to the coal tar products market, creosote is at the moment a little scarce, otherwise nothing of an outstanding feature presents itself. Prices generally remain steady.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80% £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech. 80%, £38 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—SCOTLAND: Granulated commercial, £26 10s. per ton; B.P. crystals, £35 10s.; B.P. powder, £36 10s. in 1-cwt. bags d/d free Great Britain in 1-ton lots upwards.

ACID CHROMIC.—10½d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—LONDON: 9½d. per lb.; less 5%. MANCHESTER: 9½d.

ACID, CRESYLIC.—97/99%, 1s. 1d. to 1s. 7d. per gal.; 98/100%, 1s. 5d. to 2s.

ACID, FORMIC.—LONDON: £47 10s. per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £48; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 7s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £49 to £52 ex store. MANCHESTER: £48 to £52 ex store.

ACID, SULPHURIC.—Average prices f.o.r. British makers' works, with slight variations owing to local considerations; 140° Tw. crude acid, £3 per ton; 168° Tw. arsenical £5 10s.; 168° Tw. non-arsenical, £6 15s. SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—LONDON: 11d. per lb. SCOTLAND: B.P. crystals, 11d., carriage paid. MANCHESTER: 11¾d.

ALUM.—SCOTLAND: Lump potash, £9 per ton ex store.

ALUMINA SULPHATE.—LONDON. £8 5s. to £9 10s. per ton. SCOTLAND: £8 to £8 10s. ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £32 per ton; powdered, £34, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £19 to £20. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £26 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC.—LONDON: £17 c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £22 10s. at mines.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot 35/37% £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 15s. in 5/6 cwt. casks.

BORAX, COMMERCIAL.—Granulated, £15 10s. per ton; powder, £17 packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

CADMIUM SULPHIDE.—2s. 8d. to 3s.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—3d. to 4½d.

CARBON TETRACHLORIDE.—£41 to £46 per ton, drums extra.

CHROMIUM OXIDE.—10½d. per lb., according to quantity d/d U.K. Green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3½d. per lb. Liquor, £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—LONDON: £4 per cwt.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £28 per ton. SCOTLAND: 40%, £28 ex store.

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON: White, £35 per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £31 10s.; brown, £29 10s.

LEAD NITRATE.—£28 per ton.

LEAD, RED.—SCOTLAND: £25 10s. to £28 per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid.

LITHOPONE.—30%, £17 10s. to £18 per ton.

MAGNESITE.—SCOTLAND: Ground Calcined £9 per ton ex store.

METHYLATED SPIRIT.—61 O.P. Industrial 1s. 8d. to 2s. 3d. per gal. Pyridinised Industrial, 1s. 10d. to 2s. 5d. Mineralised, 2s. 9d. to 3s. 3d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£49 per ton d/d.

NICKEL SULPHATE.—£49 per ton d/d.

PHENOL.—9d. to 10d. per lb. nominal.

POTASH, CAUSTIC.—LONDON: £42; MANCHESTER: £41.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5¾d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100% powder, £37. MANCHESTER: £37 10s.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND: Refined Granulated £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8¾d. to 9d. per lb. SCOTLAND: B.P. crystals, 8½d. MANCHESTER: Commercial, 8¼d., B.P., 8½d.

POTASSIUM PRUSSIATE.—LONDON: 8½d. to 8¾d. per lb. SCOTLAND: Yellow spot material, 8¼d. ex store. MANCHESTER: Yellow, 8¾d.

SALAMMONIAC.—First lump spot, £42 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags, special terms for contracts.

SODA, CAUSTIC.—Solid 76/77° spot, £14 5s. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 15s. in casks, Solid 76/77%, £14 10s. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 10s. contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£22 per ton. LONDON: £23.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 10s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. LONDON: 4d. per lb. with discounts for quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. less 1 to 3½% contracts, 4d. spot lots.

SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£32 per ton.

SODIUM CHROMATE.—3⅝d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £15 ex station, 4-ton lots. MANCHESTER: Commercial, £9 5s.; photographic, £15.

SODIUM NITRITE.—LONDON: Spot, £18 to £20 per ton d/d station in drums.

SODIUM PERBORATE.—LONDON: 10d. per lb.

SODIUM PHOSPHATE.—£12 10s. per ton.

SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 4¾d. to 5¾d.

SODIUM SILICATE.—140° Tw. Spot £8 5s. per ton d/d station, returnable drums.

SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND: English material £3 15s.

SODIUM SULPHATE (SALT CAKE).—Unground Spot, £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 5s.

SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.

SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £9 10s. d/d station in bags.

SULPHATE OF COPPER.—MANCHESTER: £16 10s. per ton f.o.b.

SULPHUR.—£11 10s. per ton. SCOTLAND: Flowers, £11; roll, £10 10s.; rock, £9; ground American, £10 ex store.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.

VERMILION.—Pale or deep, 4s. 3d. to 4s. 5d. per lb.

ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.

ZINC SULPHATE.—LONDON AND SCOTLAND: £12 per ton.

ZINC SULPHIDE.—11d. to 1s. per lb.

Essential Oils

CAMPHOR.—Brown, 65s. per cwt.; White, 95s.

CINNAMON.—Ceylon, 3s. 3d. per lb.

CITRONELLA, JAVA.—2s. 6d. per lb.

LAVENDER, MONT BLANC, 38/40%.—12s. 9d. per lb.

LEMON.—5s. per lb.

LEMONGRASS.—4s. per lb.

OTTO OF ROSES.—Anatolian, 33s. per oz.; Bulgarian, 45s.

PEPPERMINT.—Japanese, 5s. per lb.; Wayne County, 13s. 6d.

Intermediates and Dyes

IN the following list of intermediates delivered prices include packages except where otherwise stated:—

ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.

ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.

ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.

ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.

ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.

BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.

p-CRESOL 34-5° C.—1s. 9d. per lb. in ton lots.

m-CRESOL 98/100%.—2s. 3d. per lb. in ton lots.

DICHLORANILINE.—2s. 3d. per lb.

DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.

DINITROBENZENE.—8d. per lb.

DINITROTOLUENE.—48/50° C., 8d. per lb.; 66/68° C. 8¾d. per lb.

DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.

α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.

β-NAPHTHOL.—Spot, £78 15s. per ton in paper bags; £79 15s. in casks, in 1-ton lots.

α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.

β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.

o-NITRANILINE.—5s. 10d. per lb.

m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 4½d. per lb.; 5-cwt. lots, drums extra.

NITRONAPHTHALENE.—9d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.

o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.

p-TOLUIDINE.—Spot, 1s. 11d. per lb., d/d buyer's works.

m-XYLIDINE ACETATE.—3s. 4d. per lb.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 9d. to 10d. per lb.; crude, 60's, 2s. 5d. to 2s. 6d. per gal. MANCHESTER: Crystals, 9d. per lb.; crude, 2s. 7d. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.

ACID, CRESYLIC.—90/100%, 1s. 6d. to 1s. 8d. per gal.; pale, 98%, 1s. 4d. to 1s. 5d.; pale 95%, 11d. to 11½d.; dark, 10d., all according to specification; refined, 1s. 8d. to 1s. 9d. LONDON: 98/100%, 1s. 3d.; dark, 95/97%, 11d. SCOTLAND: Pale, 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark, 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.

ANTHRACENE OIL.—Strained, 4½d. per gal.

BENZOL.—At works, crude, 9d. to 9½d. per gal.; standard motor 1s. 4d. to 1s. 4½d.; 90%, 1s. 5d. to 1s. 6d.; pure, 1s. 7½d. to 1s. 8d. LONDON: Motor, 1s. 6½d. SCOTLAND: Motor, 1s. 6½d. to 1s. 7½d.; 90%, 2s. 0½d. to 2s. 1½d.

CREOSOTE.—B.S.I. Specification standard, 3d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 3d. to 3½d. f.o.r. North; 4d. to 4½d. London. MANCHESTER: 3d. to 4½d. SCOTLAND: Specification oils, 3½d. to 4d.; washed oil, 3½d. to 4d.; light, 3d. to 3½d.; heavy, 4½d. to 5d.

NAPHTHA.—Solvent, 90/160%, 1s. 4d. to 1s. 5d. per gal.; 95/160%, 1s. 8d.; 99/190%, 11d. to 1s. 1d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.

NAPHTHALENE.—Crude, Hot-Pressed, £6 1s. 3d. per ton. Flaked, £10 per ton. Purified crystals, £9 10s. per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 70s. to 75s.

PITCH.—Medium soft, £3 15s. to £4 per ton. MANCHESTER: £3 15s. f.o.b. LONDON: £3 15s. f.o.b. East Coast port for next season's shipment.

PYRIDINE.—90/140, 4s. 3d. to 5s. 6d. per gal; 90/180, 2s. to 2s. 6d. SCOTLAND: 90/160%, 4s. to 5s.; 90/220%, 1s. 9d. to 2s. naked.

REFINED COAL TAR.—SCOTLAND: 4d. per gal.

TOLUOL.—90%, 2s. 4d. per gal.; pure, 2s. 9d.

XYLOL.—Commercial, 2s. 2d. to 2s. 3d. per gal.; pure, 2s. 4d.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Home, £6 15s. per ton; export, £6 7s. 6d. per ton for September shipment f.o.b. U.K. ports in single bags.

NITRO-CHALK.—£7 5s. per ton.

NITRATE OF SODA.—£7 8s. 6d. per ton.

CALCIUM CYANAMIDE.—£7 per ton.

CONCENTRATED COMPLETE FERTILISERS.—£10 9s. 6d. to £11 per ton, according to percentage of constituents.

Latest Oil Prices

LONDON, Sept. 20.—LINSEED OIL was firmer. Spot, small quantities, £23 per ton; Oct., £20 2s. 6d.; Oct.-Dec., £20 7s. 6d.; Jan.-April, £20 15s., naked. RAPE OIL was quiet. Crude, extracted, £28 per ton; technical, refined, £29 10s., naked, ex wharf. COTTON OIL was quiet. Egyptian, crude, £19 10s. per ton; refined common edible, £21 15s.; and deodorised, £23 15s., naked, ex mill. TURPENTINE was steady. American, spot, 48s. 3d. per cwt.

HULL.—LINSEED OIL, spot, quoted £20 15s. per ton; Sept., £20 2s. 6d.; Oct.-Dec., £20 5s.; Jan.-April, £20 12s. 6d. COTTON OIL, Egyptian, crude, spot, £19; edible, refined, spot, £21 10s.; technical, spot, £21 10s.; deodorised, £23 10s., naked. PALM KERNEL OIL, crude, f.m.q., spot, £18 10s., naked. GROUNDNUT OIL, extracted, spot, £23; deodorised, £27. RAPE OIL, extracted, spot, £27; refined, £28 10s. SOYA OIL, extracted, spot, £20 10s.; deodorised, £23 10s. per ton. COD OIL, 21s. per cwt., nominal. CASTOR OIL, pharmaceutical, 38s.; first, 33s.; second, 30s. per cwt. TURPENTINE, American, spot, 50s. 6d. per cwt.

New Chemical Trade Marks

Compiled from official sources by Gee and Co., Patent and Trade Mark Agents, 51-52 Chancery Lane, London, W.C.2.

Opposition to the registration of the following trade marks can be lodged up to October 6, 1933.

Terrazine. 543,021. Class 1. Paints, varnishes, enamels (in the nature of paint), colours, distempers, japans, lacquers, paint and varnish driers, wood preservatives, wood stains, anti-corrosive and anti-fouling compositions, and anti-corrosive oils. Blundell, Spence and Co., Ltd., Bankside Works, Sculcoates Lane, Hull; and 9 Upper Thames Street, London, E.C.4. July 13, 1933.

Envial. 542,401. Class 4. Oils and fats for use in manufactures and not included in other classes. H. Th. Böhme Aktiengesellschaft, 29 Moritzstrasse, Chemnitz, Saxony, Germany. June 19, 1933.

Noitrol. 542,402. Class 4. Oils and fats for use in manufactures and not included in other classes. H. Th. Böhme Aktiengesellshaft, 29 Mortizstrasse, Chemnitz, Saxony, Germany. June 19, 1933.

Opposition to the registration of the following trade marks can be lodged up to October 13, 1933.

Calbux. 540,823. Class 1. Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. I.C.I. (Lime), Ltd., Royal Exchange Buildings, Spring Gardens, Buxton, Derbyshire. April 19, 1933.

Beaconit. 541,600. Class 1. Manganese dioxide for use in electric batteries. Bush, Beach and Gent, Ltd., Marlow House, Lloyds Avenue, London, E.C.3. May 19, 1933.

Company News

International Paint and Cmpositions Co.—An ordinary interim dividend of 3 per cent., less tax, is payable on September 30.

Broken Hill South, Ltd.—The net profits for the year to June 30 last amount to £240,673, compared with £117,226 in the previous year.

International Nickel Co.—A quarterly dividend at the rate of 7 per cent. per annum was declared on September 11 on the preferred stock, payable on November 1.

Murex, Ltd.—A final dividend of 20 per cent., less tax, making 30 per cent. for the year ended June 30 last, is announced, payable on October 6.

Thomas Firth and John Brown, Ltd.—The directors announce that trading conditions do not justify any dividend payment on the preference capital.

Boots Pure Drug Co.—An extraordinary general meeting has been called for October 10, at 12 noon, for the purpose of considering a resolution for splitting the ordinary shares. It is proposed to split the £1 shares into shares of 5s.

British Aluminium Co.—The half-yearly payment on the preference shares has been announced, but the directors state that it has been decided to await the full year's results before the consideration of a payment on the ordinary shares.

Onverwacht Platinum Co.—For the year ended June 30 last, the report states that cash and cash assets at June 30, 1932, amounted to £55,724, to which must be added £3,971, the net sum realised from sale of plant and equipment, and £262, being the net revenue for the year, making £59,957.

Major and Co.—The accounts to March 31 last, show a gross profit of £8,418, against £6,593 last year. After deducting the debit brought in of £2,127, the directors' special services £100, depreciation £3,875, bank interest £4,027, and tax £497, there is a debit of £2,207 remaining to be carried forward. It is further proposed to pay £150 in directors' fees.

British Sugar Manufacturers.—The report for the year ended March 31 last, states that after providing for all charges, including maintenance of buildings, plant and roads amounting to £8,658, and loan and debenture interest £16,883, there was a loss of £23,110, to which is added a loss on exchange of £3,569 and depreciation £16,577. After crediting balance carried forward from last year of £6,819, there remains a debit of £36,437.

Eastman Kodak Co.—The statement of earnings for the 24 weeks ended June 17, 1933, shows a profit before depreciation and tax of $7,832,752, against $7,122,239 a year ago. Depreciation takes $2,711,739 and U.S. and foreign taxes $772,389, leaving a net profit of $4,348,624. The net profit for 1933 period is equivalent, it is stated, after payment of preferred dividends, to $1.84 per share on the common stock.

Staveley Coal and Iron Co.—In their report for the year to June 30, 1933, the directors state that the net profit, including subsidiary dividends, after expenses and taxation, is returned at £404,820, compared with £372,292 a year ago. Depreciation takes £167,485, against £146,346, and general reserve again receives £50,000, while a further depreciation charge against house properties absorbs £10,000. The dividend for the year is maintained at 5 per cent., tax free, the carry-forward then being £108,556, against £107,156. The annual meeting will be held at Royal Victoria Station Hotel, Sheffield, on September 27, at 2 p.m.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Uruguay.—His Majesty's Consul at Montevideo reports that the State Electricity and Telephone Works is calling for tenders to be presented in Montevideo by November 6, 1933, for the supply of 288,000 kilogs. of lubricating oils. (Ref. B.Y. 7666.)

New Companies Registered

Catalysts, Ltd. Registered September 6. Nominal capital £10,000 in £1 shares. To enter into an agreement with E. R. W. de Mahler, C. Imeretinsky and J. Swinburne, to accquire work, manufacture, develop and deal with inventions and other matters relating to catalysts, hydrogenation of coal and other substances, carbonisation and similar processes, and to carry on the business of chemists, metallurgists, general and consulting engineers, research chemists, etc. Directors: H. F. Wright, Yeldenby Hall, Derby; and J. Swinburne.

Copper Development Association.—Registered on September 19 as a company limited by guarantee without share capital, with 100 members liable for £5 in the event of winding up. To promote, with a view to increasing the consumption of copper, co-operation between persons, firms and companies, including those who are or may become members of the Association and who alone or in co-partnership or otherwise carry on business as miners, smelters, refiners, producers, manufacturers, fabricators and/or dealers in or distributors of, or are othewise connected with or interested in, copper and/or copper-containing materials. Subscribers include: Imperial Chemical Industries, Ltd., Imperial Chemical House, Millbank, S.W.1, and Monel Nickel Co., Ltd. Until otherwise determined by the council, the Rt. Hon. Sir Auckland Geddes, A. C. Beatty and Sir Harry McGowan shall be honorary presidents.

G. Appleyard and Co., Ltd. Registered September 14. Nominal capital £2,500 in £1 shares. Manufacturers of and dealers in size, glue, resin, soap, grease, dyes, dyeware, paints, varnishes, drugs, etc. Directors: G. W. Odey, "Malvern," Beverley High Road, Hull, and E. H. Ramm.

Ozopine Soap and Products, Ltd., 19 Grosvenor Place, Hyde Park, S.W.1. Registered September 15. Nominal capital £5,000 in 3,000 7½ per cent. preference shares of £1 and 16,000 ordinary shares of 2s. 6d. each. Manufacturers, refiners, distillers, separators, blenders and importers and exporters of, agents for and dealers in all kinds of soap and saponaceous preparations, oils, lubricants, greases, etc. Directors: H. B. Hughes, Stanford House, Hassocks, Sussex, and E. G. Collins.

Books Received

Industrial Chemistry. By Emil Raymond Riegel. New York: The Chemical Catalog Co., Inc. Pp. 784. $6.00.

This Soft Age. By Ernest J. P. Benn. London: Ernest Benn, Ltd. Pp. 182. 3s. 6d.

Rubber in Chemical Engineering. By H. P. Stevens and M. B. Donald. Issued by the Rubber Growers' Association, Inc. London: Pp. 56.

Official Publications

Financial and Economic Conditions in Roumania in 1932. Report by R. J. E. Humphreys. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 91. 2s. 6d.

Report on the Economic Situation in Estonia as at the End of June, 1933. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 12.

Survey of the Import Trade of India during the period April 1 to June 30, 1933. Department of Overseas Trade. Pp. 24.

Forthcoming Events

Sept. 24-30.—Société de Chimie Industrielle. 13th Congress at Lille.

Sept. 25-29.—International Chemists' Exhibition. Royal Agricultural Hall, Islington, London.

Sept. 26.—The Institute of the Plastics Industry (London Section). "Some Cellulose Products and their Applications in the Plastics and Related Industries." Victor E. Yarsley. Windsor Castle Hotel, Victoria, London.

Sept. 27.—Electrodepositors' Technical Society. Discussion—"The Removal of Electrodeposits by Stripping," opened by F. L. James and J. W. Perring. 7.30 p.m. Lyons' Angel Café, Islington, London.

Sept. 28 to 30.—The Faraday Society. General Discussion on Free Radicals. Physical Chemistry Laboratory, Cambridge.

From Week to Week

THE PARIS OFFICIAL JOURNAL has published a decree suppressing the quotas on various chemicals, including magnesium, iodoform and tartaric acid, and on linoleum and vulcanised fibres.

THE ZUID-NEDERLANDSCHE MELASSESPIRITUSFABRIEK, which is located at Bergen op Zoom (Holland), is stated to have added amyl acetate, isobutyl-acetate and propyl acetate to its range of manufactures.

VARIOUS PATENTS of the I. G. Farbenindustrie have been acquired by the Ungarische Pharma A.-G., Hungary, which contemplates starting up the production of pharmaceutical chemicals with the aid of new plant.

THE RECONSTRUCTION OF THE PREMISES of James Crean and Co., Ltd., soap manufacturers, in North King Street, Dublin, is now nearly complete, and production is stated to have returned to normal. The building was badly damaged by fire recently.

EIGHT ACCIDENTS, reportable under the Factory and Workshops Acts, occurred in chemical and allied factories in the Irish Free State during 1932, states the report of the Department of Industry and Commerce. This is an increase of two on the previous year's figure.

THE DIESEL ENGINE USERS' ASSOCIATION and the Institution of Chemical Engineers will hold a joint meeting at the Caxton Hall, Westminster, S.W.1, on October 12. The meeting begins at 3 p.m., and Mr. L. O. Newton, M.I.Chem.E., will read a paper on the "Treatment of Cooling Water for Diesel Engines."

CATALYSTS employed in the synthesis of phenol by saponification of monochlorbenzene in the vapour phase generally renew their activity by oxidising treatment, *e.g.*, with air, at an elevated temperature, according to a note which appears in the "Chemiker-Zeitung," September 13, page 725.

THE LORD MAYOR OF BIRMINGHAM and the Lady Mayoress (Councillor H. E. Goodby and Mrs. Goodby) on Wednesday night gave a reception at the Council House to delegates and others associated with the autumn meeting of the Institute of Metals. The guests numbered about four hundred. Dancing took place in the ballroom.

ANNOUNCEMENT IS MADE OF THE DISCOVERY by Dr. Schoop (Zurich) that continuous filaments are produced when molten glass is sprayed from an electro-metallising pistol. The high viscosity of the liquid prevents the disruption into particles of powder which molten metal undergoes on issuing from the apparatus.

MR. J. M. WILSKER, chemical engineer of the South African firm, Union Glass, Ltd., Dundee, Natal, will shortly visit England on a combined business and holiday trip. Mr. Wilsker has been invited to collaborate with Professor W. E. S. Turner, head of the Department of Glass Technology, Sheffield University, on problems relating to the glass industry.

EMPLOYEES OF LEVER BROS., LTD., and associated companies all over the world celebrated "Founders' Day" last Saturday, in commemoration of the first Lord Leverhulme. Members of the London staff assembled at the company's sports ground at New Eltham, and Lord and Lady Leverhulme were present at the gathering at Port Sunlight. The programme at both centres included athletics and a fireworks display.

INQUIRIES ARE TO BE HELD by the Standing Committee appointed by the Board of Trade under the Merchandise Marks Act, 1926, as to whether imported maize starch (including maize starch cornflour) should be required to bear an indication of origin. Any communication on the subject of these inquiries should be addressed to Mr. E. W. Reardon at the Board of Trade Offices, Great George Street, London, S.W.1.

THE HOME SECRETARY announces an Order in Council applying, with modifications, Part III of the Dangerous Drugs Act (1920) to methylmorphine and ethylmorphine, and their respective salts. The order will become effective on and after October 1, after which date imports will only be allowed by special licence. Eventually, the manufacture and trading in these drugs will be controlled. Compounds are not affected.

THE INSTITUTION OF CHEMICAL ENGINEERS will hold the opening meeting of the 1933-34 session on October 6, at 6 p.m. in the rooms of the Chemical Society, Burlington House, Piccadilly, W.1. A paper on "The Sedimentation of Fine Particles in Liquids," will be presented by Mr. R. F. Stewart, M.I.Chem.E., and Mr. E. J. Roberts. The meeting will be presided over by Mr. H. Talbot, vice-president.

THE ASSOCIATION OF TECHNOLOGISTS OF THE RIVER PLATE at Buenos Aires (Argentina) held its second ordinary meeting at the English Club on August 8, when Mr. Edgar Berry gave an interesting paper on "Atomic Weights." This was followed by a discussion in which several members participated. The hon. secretary of this newly-formed association is Mr. M. Martin Charap.

A DIESEL ELECTRIC RAILWAY LOCOMOTIVE has been demonstrated at the Shipping, Engineering and Machinery Exhibition at Olympia, propelled by oil produced from coal. The locomotive was made by Armstrong Whitworth.

COATBRIDGE IS DISAPPOINTED OVER the news that Summerlea Iron and Chemical Works are not to be restarted, which were closed down in October, 1930. The news of the permanent shutting down of the works was made public during the hearing of an appeal by the firm against a valuation of the premises.

THE "MORNING POST" this week has made a special feature of the problem of public works, and has published a debate between Sir Arthur Salter, the well-known planner, whose views appeared on Wednesday, and Sir Ernest Benn, taking the Individualist view, who replied to Sir Arthur on Thursday.

THE FIRST ISSUE of "The Independent," the new anti-political weekly, will be published on October 7. The new journal will superimpose upon the regular features of the ordinary weekly review a news service of its own, and adequate attention will be given to the humorous side, to sport, travel and motoring.

INVESTIGATIONS INTO THE INDUSTRIAL USES OF PEAT are being carried out in the Irish Free State and it is understood that the research workers are hopeful of obtaining from it a new tanning solution. Other likely results from the work are the uses of peat for industrial alcohol distillation and the discovery of a new pigment.

MR. FRANK HODGES, in his inaugural address to the Sir John Cass Technical Institute on September 18, stated that foreign oil was the real enemy of coal, and must be attacked over the next decade with the utmost technical and scientific vigour. What was needed was a mass research attack upon the whole problem of scientific coal utilisation.

ORDERS FOR PLANT for the new I.C.I. oil from coal undertaking at Billingham have now been placed. As was expected, the contract is shared by the English Steel Corporation and Thos. Firth and John Brown, Ltd., both of Sheffield, and amounts to about £250,000. An initial output of 100,000 tons of petrol a year, using a total of 1,000 tons of coal day, is scheduled.

WE REGRET TO ANNOUNCE THE DEATH on Tuesday, at the age of 85, of Sir Alexander Glegg, who lived in Wimbledon Park, London. He had recently undergone a slight operation. Sir Alexander was a director of J. I. Thornycroft, Ltd., and Barry and Staines Linoleum, Ltd., and was chiefly responsible for introducing the use of aluminium in the manufacture of cooking utensils.

IMPORTS OF ACETIC ACID in Great Britain in August totalled 10,201 cwt., compared with 505 tons in August, 1932. In the summary of the Board of Trade returns published in THE CHEMICAL AGE last week no note was made of the fact that the basis of the returns had been changed from tons to cwt. Actually there was a difference of only 101 cwt. between the imports for the two months.

AMONG LATEST WILLS are those of Major Godfrey Mark Palmer, Loftus in Cleveland, Yorks, chairman of the Chislet Colliery, Ltd., and the Marley Hill Chemical Co., Ltd., £23,217 (net personalty £18,944); and Major Walter Field Soames, Knightsbridge, London, S.W., formerly chairman and managing director of Wilkie and Soames, Ltd., Thames Soap and Candle Works, Greenwich, S.E., £104,055 (net personalty £93,945).

DR. HERBERT L. IVES, who is to deliver the Thomas Young Oration before the Physical Society on October 6 at the Royal Institution, is well known to British physicists interested in optical subjects for his work on the theory and practice of modern photometry and colorimetry. To him we owe the first systematic study of the problems of heterochromatic photometry, and his classical work on the theory of the flicker photometer is still the basis of present-day practice in the use of this instrument.

A WORLD AGREEMENT to check the unrestrained production of oil is "the only hope" of the oil industry, according to Mr. A. L. Pratt, president of the Vacuum Oil Co., who has been in this country for a month. In an interview prior to his departure for New York he stated that American producers had agreed to restrict their output of crude oil, and he hoped that such an agreement would one day operate everywhere, including Russia and Rumania.

THE IMPORT DUTIES ADVISORY COMMITTEE has received applications for the addition to the free list of nickel mass (consisting substantially of nickel hydroxide and graphite) and cadmium mass (consisting substantially of finely divided metallic cadmium and iron partially oxidised); and for drawback under Section 9 of the Finance Act, 1932, in the case of castor oil, in respect of the castor seed used in its manufacture. Representations should be addressed in writing to the Secretary, Import Duties Advisory Committee, Caxton House (West Block), Tothill Street, Westminster, London, S.W.1, not later than October 16.

NEGOTIATIONS WHICH HAVE BEEN TAKING PLACE for some considerable time have now been completed, whereby the shares held by International Combustion Engineering Corporation of New York, in International Combustion, Ltd., of Aldwych House, Aldwych, London, W.C.2, have been acquired by British interests. No shares are now held in the United States of America.

NO KELP for the manufacture of iodine was exported from the Irish Free State during the first seven months of this year, although the value in the corresponding period in 1932 was £15,594. Inquiries in Dublin showed that the cessation of the export was due to the fact that the world price of iodine had fallen to such an extent that kelp was exceedingly hard to dispose of. Although the export trade from Ireland is non-existent at the present time, the iodine factory at Galway is using a large quantity of kelp.

THE JOINT ADVISORY COMMITTEE, representative of the Board of Education, local education authorities, technical colleges, and the Manchester and Liverpool sections of the Society of Chemical Industry and of the Institute of Chemistry, which was set up in 1931 with the object of arranging a scheme of courses of a post-advanced character in chemistry, has recently issued its 1933-34 syllabus of classes to be held at the College of Technology, Manchester; the Central Technical School and the City Bacteriological Laboratory, Liverpool; and the Technical College, Widnes. Particulars of these classes, which include bacteriology, modern organic syntheses and methods of synthesis (Liverpool), some applications of physical chemistry in textile industries, modern apects of surface chemistry, principles of costing as applied to the chemical industry (Manchester), chemical engineering, and fuel technology (Widnes), can be obtained from the above-mentioned institutions. The full programme of the Royal Technical College, Glasgow, has also been published, and includes full details of the courses in chemistry, dyeing, metallurgy, etc.

SIR RICHARD PEASE has announced his retirement from his position as managing director of Pease and Partners, colliery owners, whose head office is at Darlington. The vacancy has not been filled, but the post of general manager has been created. Sir Richard will retain his directorship and will continue his connection with the firm.

THE FIFTH ANNUAL CONFERENCE of the National Smoke Abatement Society opened at Sheffield last night (Friday) with a reception by the Lord Mayor in the Town Hall. The annual general meeting takes place to-day in the City Hall, with the president, Dr. H. A. Des Voeux, in the chair, and the first session will follow immediately. The second session will be held on Sunday morning, and the meeting will wind up with a motor coach tour through Derbyshire.

OVER ONE HUNDRED MEMBERS of the Aberdeen Mechanical Society paid a visit to the premises of Farquhar and Gill, North of Scotland Colour Works, St. Paul Street, Aberdeen, on September 15, when the processes by which paint is made were explained to them. Mr. Patrick Mitchell, works manager, acted as guide to the party, conducting them through the various departments, and pointing out the various stages in manufacturing paints and varnishes.

ALTHOUGH THE BRITISH INDUSTRIES FAIR does not open until February 19, the Department of Overseas Trade has already received applications for more than 90 per cent. of the space occupied by exhibitors at Olympia and in the Furniture Section at the White City at the last Fair. Up to August 28 applications were received from 875 prospective exhibitors for a total of 341,118 sq. ft. of exhibition space. At the 1933 Fair, 1,438 exhibitors in the corresponding groups occupied 378,867 sq. ft. In the heavy industries section at Birmingham, advance bookings of space by exhibitors are so far ahead of those last year, or indeed, in any previous year, that some 55,000 sq. ft. of indoor area are being added immediately to meet pressing demands.

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